103rd Annual Meeting: The Ohio Academy of Science: Hosted by The Medical College of Ohio at Toledo April 22-24, 1994

The Ohio Journal of Science. v94, n2 (April Program Abstracts), 2-49
http://hdl.handle.net/1811/23604

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103rd Annual Meeting
The Ohio Academy of Science
Hosted by The Medical College of Ohio at Toledo
April 22-24, 1994

WELCOME

The Medical College of Ohio welcomes the 103rd Annual Meeting of The Ohio Academy of Science. Founded in 1964, MCO celebrates its 30th anniversary this year as one of Ohio's leading biomedical education and research centers. We invite you to explore our campus and to share in the excitement and challenge represented in this program.

REGISTRATION

REGISTRATION IS REQUIRED FOR ALL MEETING PRESENTERS AND ATTENDEES. On-site registration will be available at a higher rate. Meals cannot be guaranteed after April 13, 1994.

To assure reservations for banquets, registrations must be received by MCO by April 13, 1994.

Please Use Registration Form on last page. Please send the completed form and fees (payable to The Medical College of Ohio) by April 13, 1994 to:

Center for Continuing Education
Medical College of Ohio
OAS Annual Meeting Registration
P.O. Box 10008
Toledo OH 43699

Phone (419) 381-4237
FAX (419) 381-4025

Registration by credit card or purchase order only will be accepted by FAX at (419) 381-4025. An acknowledgment will be sent to those preregistered and paid by April 13. Your packets, tickets, and name tag will be ready at the meeting registration desk upon your arrival.

For further information, please call (419) 381-4237 or FAX (419) 381-4025.

Friday, April 22
(Dana Conference Center, MCO)

Registration for the field trip to the Sun Oil Company and the geology symposium for Friday will be held at the Dana Conference Center at The Medical College of Ohio at Toledo. On-site registration is possible by check, VISA, or Mastercard.

Saturday, April 23
(Dana Conference Center, MCO)

Registration and all technical and poster sessions will be in Dana Conference Center at The Medical College of Ohio at Toledo. On-site registration at the meeting registration desk on the ground floor lobby of the MCO Dana Conference Center is possible by check, VISA, or Mastercard.

8:00 am - 3:00 PM for technical and poster sessions

PARKING

Use the Dana Conference Center parking lot.

SMOKING POLICY

Smoking in buildings is not permitted.

MEALS

Friday, April 22

A cafeteria and fast food restaurants are available for breakfast and lunch on and near the MCO campus. A list will be available at REGISTRATION.

6:00 PM OAS/OBS Dinner at The Hilton Inn adjacent to the Dana Conference Center (Reservations required by April 13)

Saturday, April 23

Breakfast and lunch are available in the Hilton Inn, on campus and at nearby fast food restaurants.

OAS Annual Meeting Banquet at 6:30 P.M. in Hilton Inn (Reservations required by April 13)

Sunday, April 24

The Geology Field Trip to the Essrock Materials Inc. quarry is planned between 8:30 AM and 12 noon. Lunch will be on your own.

HOUSING

Please contact hotels and motels directly. Listed below are area motels.

HEADQUARTERS HOTEL
(Adjacent to the Dana Center on the Campus of The Medical College of Ohio at Toledo.)

Hilton Inn Toledo
3100 Glendale Ave.
Toledo OH 43614
419/381-6800 or 1-800-HILTONS

A block of rooms has been reserved at the Toledo Hilton Hotel. This hotel is located on the 350 acre campus of the Medical College of Ohio and is directly connected to the Eleanor N. Dana Conference Center by an enclosed walkway. The Toledo Hilton has a tennis court, an indoor pool, sauna and spa. Hotel guests are invited to use the Morse
Fitness Center at the Medical College of Ohio which is accessible via an enclosed walkway. This Center features a running track, racquetball and basketball courts and exercise equipment. Toledo Hilton room rates are $65.00 single or double. Please make your reservation by calling the Toledo Hilton Hotel at (419) 381-6800. Identify yourself as being with The Ohio Academy of Science Annual Meeting to receive this reduced rate.

### Other Hotels

<table>
<thead>
<tr>
<th>Hotel Name</th>
<th>Address</th>
<th>Phone Number</th>
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<tr>
<td>Clarion Westgate</td>
<td>3536 Secor Road, Toledo OH 43606</td>
<td>419/535-7070</td>
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<td>Comfort Inn Westgate</td>
<td>3560 Secor Road, Toledo OH 43606</td>
<td>419/531-2666</td>
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<td>Comfort Inn West</td>
<td>1426 S Reynolds Road, Maumee OH 43537</td>
<td>419/893-2800</td>
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<tr>
<td>Courttyard by Marriott</td>
<td>1435 East Mall Drive, Holland OH 43528</td>
<td>419/866-1001</td>
</tr>
<tr>
<td>Days Inn Toledo/Maumee</td>
<td>150 Dussel Drive, Maumee OH 43537</td>
<td>419/893-9960</td>
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<tr>
<td>Days Inn of Toledo/Perrysburg</td>
<td>1-75 &amp; U.S. 20 Exit 193, Perrysburg OH 43551</td>
<td>419/874-8771</td>
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<tr>
<td>Econo Lodge</td>
<td>1800 Miami St., Toledo OH 43605</td>
<td>419/666-5120</td>
</tr>
<tr>
<td>Fairfield Inn by Marriott</td>
<td>1401 F Mall Drive, Holland OH 43528</td>
<td>419/867-1144</td>
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<td>Hampton Inn Toledo South</td>
<td>1409 Reynolds Road, Maumee OH 43537</td>
<td>419/893-1004</td>
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<td>Holiday Inn Southwyck</td>
<td>2429 S. Reynolds Road, Toledo OH 43614</td>
<td>419/381-8765</td>
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<tr>
<td>Knights Inn Toledo West</td>
<td>1520 S Holland-Sylvania Road, Maumee OH 43537</td>
<td>419/865-1380</td>
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<td>Knights Inn North</td>
<td>445 E. Alexis Road, Toledo OH 43612</td>
<td>419/476-0170</td>
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<tr>
<td>Maumee Bay Resort</td>
<td>1750 Park Road No. 2, Oregon OH 43618-9700</td>
<td>1-800-AT-A-PARK</td>
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<tr>
<td>Radisson Hotel Toledo</td>
<td>101 N. Summit St., Toledo OH 43604</td>
<td>419/241-3000</td>
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<tr>
<td>Red Roof Inn Holland</td>
<td>1214 Corporate Drive, Holland OH 43528</td>
<td>419/866-5512</td>
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<td>Red Roof Inn Maumee</td>
<td>1570 S. Reynolds Road, Maumee OH 43537</td>
<td>419/893-0929</td>
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<tr>
<td>Red Roof Inn Secor</td>
<td>3350 Executive Parkway, Toledo OH 43606</td>
<td>419/536-0118</td>
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<tr>
<td>Residence Inn</td>
<td>6101 Trust Drive, Holland OH 43528</td>
<td>419/867-9555</td>
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<tr>
<td>Toledo Airport Motel</td>
<td>11201 Airport Service Road, Swanton OH 43538</td>
<td>419/865-5531</td>
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<tr>
<td>Toledo Budget Inn</td>
<td>2450 S. Reynolds Road, Toledo 43614</td>
<td>419/865-0201</td>
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<tr>
<td>Toledo Marriott</td>
<td>2 Seagate, Toledo OH 43604</td>
<td>419/241-1411</td>
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### GENERAL SCHEDULE

**Friday, April 22, 1994**

- **8:00 AM - 3:00 PM** Registration in the Dana Conference Center, MCO
- **9:00 AM - 11:30 AM** Tour of Sun Company Refinery Pick up map at Registration in the Dana Conference Center.

The tour of Sun Company's Refinery will include a brief presentation of the refinery's history and the major units to process crude oil into gasoline and other hydrocarbon products. The presentation and the bus tour within the refinery will focus on the numerous source reduction/waste minimization efforts and opportunities that the refinery has accomplished. The bus tour will include a stop at the new wastewater treatment unit that was put into service last year at a project cost of $47 million. The tour will be limited to 80 persons. See related environmental symposium on Saturday.

- **9:30 AM - noon** Geology Symposium (See abstracts for details)
- **12:00 noon** Lunch (on your own)
- **1:30 PM - 5:00 PM** Geology Symposium
- **2:00 - 5:00 PM** Ohio Academy of Science Governing Council Meeting in the Dana Conference Center Huron Room
- **3:00 - 5:00 PM** OBS Executive Committee Meeting in the Dana Conference Center Hancock Room
- **5:00 - 6:00 PM** Reception at the Hilton Inn
- **6:00 PM** Joint Dinner of Ohio Academy of Science and Ohio Biological Survey at the Hilton Inn
- **8:00 PM** Ohio Biological Survey Advisory Council in the Dana Conference Center Seneca Room
Saturday, April 23, 1994

8:00 AM - 3:00 PM  Registration in the Dana Conference Center

8:00 AM - 9:00 AM  Past Presidents' Breakfast

9:00 AM - 11:00 AM  Morning poster and podium presentations

9:30 AM - 10:30 AM  Internet Workshop

11:15 AM  ALL ACADEMY LECTURE in the Dana Conference Center Lucas auditorium

ROGER C. BONE, M.D.
President and Chief Executive Officer
Medical College of Ohio at Toledo

Roger C. Bone, M.D., the fourth president of the Medical College of Ohio, assumed the position September 1, 1993.

Dr. Bone is a former dean of Rush University Medical College, where he held two endowed chairs, and served as vice president of medical affairs at Rush-Presbyterian-St. Luke's Medical Center in Chicago.

A graduate of Hendrix College in Conway, Arkansas, Dr. Bone received his doctor of medicine degree in 1967 from the University of Arkansas Medical School. He completed his residency and fellowship training in pulmonary medicine at the University of Texas Southwestern Medical College in Dallas between 1970 and 1974.

Dr. Bone was a captain in the United States Army from 1967 to 1969 and served in Cu Chi, Vietnam. He was awarded the Army Commendation Medal for Valor and the Army Commendation Medal for Distinguished Service.

From 1974 to 1977, Dr. Bone was a faculty member at the University of Kansas Medical Center in Kansas City, Missouri, and consultant to the Missouri Veteran's Administration Hospital. In 1977, he was appointed an associate professor of medicine and chief of the pulmonary division of the University of Arkansas for Medical Sciences-Veteran's Administration Complex in Little Rock. In 1979, he was named an associate professor of medicine.

Dr. Bone joined the faculty of Rush Medical College in 1984 as professor and chairman of the Department of Medicine. He was named dean and vice president for medical affairs in 1992, and served as chief of the Medical Center's pulmonary and critical care division. He was named a Master Teacher in 1993 by the American College of Chest Physicians. He also served as host of "Internal Medicine Update," a weekly program for physicians that was carried nationally on cable television.

Dr. Bone has been a consulting editor of the Journal of the American Medical Association, and is co-chairman of the editorial board of the Journal of Critical Illness. He is senior editor of Critical Care Medicine and has been a department editor of Concepts in Emergency and Critical Care Medicine. He is co-editor-in-chief of the Yearbook of Pulmonary Disease, serves on the editorial boards of numerous journals, and is editor-in-chief of the two volume Textbook of Pulmonary and Critical Care Medicine.

Dr. Bone's research in the field of pulmonary medicine and critical care has been supported by funding from the National Institutes of Health, the United States Environmental Protection Agency, and private industry. He has published extensively in scientific journals and had edited more than 30 books.

Dr. Bone is a past president of the American College of Chest Physicians and the International Academy of Chest Physicians and Surgeons. He is a lifetime Honorary Member of the American Association of Respiratory Care.

12:00 noon  Lunch (on your own)

1:30 PM - 5:00 PM  Afternoon poster and podium presentations

5:15 PM  Annual Business Session for Academy Members Only

5:30 - 6:30 PM  Reception in the Hilton Inn

6:30 PM  Banquet and Awards Ceremony in the Hilton Inn

Recognition of Newly Elected Fellows by Dr. Ronald L. Stuckey, President Elect

Other Awardees

President's Address:
Interregional Trade, the Adjunct to Development Policy

DR. RICHARD W. JANSON
The Janson Industries
Canton, Ohio

Since 1986 when the Ph.D. degree in Geography was conferred by Kent State University, the focus of Richard W. Janson's post doctoral research has been on mathematical modeling of large, complex production systems, including: (1) methods for simultaneous solution of all sector, all-region trade; (2) methods for evaluation of differential regional effects, including feedback effects; and (3) policy formulation for the Ohio economic-spatial system. His formal academic work included undergraduate work in physics at Denison University, the study of geography at Kent State University, and economics at The University of Chicago and Duke University.
Approximately 50 papers have been published under the authorship of Richard W. Janson. Most have been on topics related to economic development including papers on defense industry, small business, high technology industry, historical development of regions, maquiladora operations, Markovian analysis, development policy for Ohio, input-output modeling, interregional trade, industrial location, market targeting models, and the comparative advantage of regions. All of the papers have been presented at meetings or sessions of professional groups or were presented to boards or committees to assist policy evaluation or were published in regarded journals including The Ohio Journal of Science.

As a charter member of the Industrial Technology and Development Enterprise Advisory Board (The Edison Board) President Janson has served continuously for both Governors Richard F. Celeste and George V. Voinovich, since the legislature of Ohio created the Board. This Board has been charged with guiding the State of Ohio in the establishment of policies for successful transition of the industries of Ohio into the next century: that is, into the global economy of the developed world. The Edison Board has established high technology research centers. Three centers have core technologies that cross all manufacturing industries — welding, polymers, and advanced materials; three centers are regionally based and specialize in advanced manufacturing technologies; and one is focused on biotechnologies — medical applications and directed genetic research. In addition, related centers for artificial intelligence, sensor technology, technology transfer, technology development, and training have been funded and supported through the Edison initiatives. All of the Edison Centers are based on the comparative advantage of the regional industries and the regional universities. The Board has also funded high technology research by seed development grants and several small business, start-up centers (incubators). Dr. Janson serves as the Chairman of the Edison Board.

The Janson brothers, Richard and Raymond, have owned and operated The Janson Industries for almost 35 years. During this time they have performed several thousand stage equipment and stage lighting contracts throughout Ohio, the nation and overseas. They were also the dominant source for planetariums and driver trainer simulators in schools and universities throughout the United States. The Janson Industries constructed, and operated a commercial UHF television station, WJAN TV, in Canton for ten years.

Dr. Janson served as a trustee of The Wilderness Center in Stark County, Ohio during its formative period. The Center is a research and educational institution that serves the people of northern Ohio, especially school children, and consists of a primitive area and farm that comprise about 1000 acres with some primeval forest, and an interpretive building.

Dr. Janson also serves as a member of the Governing Board of the American Geographical Society and as an adjunct Professor of Geography at Kent State University.

Sunday, April 24, 1994

8:30 AM - 12:00 Noon Geology Field Trip
Sponsored by The Ohio Senior Academy of Science Division of Earth & Space Sciences. Arranged and led by Dr.'s Mark J. Camp and Craig B. Hatfield, Dept. of Geology, University of Toledo.

Stratigraphy and paleontology of the Middle Devonian Silica Shale of Essroc Materials Inc. quarry at Sylvania, Ohio.
Leave at 8:30 AM from the parking lot on the south side of the MCO Hilton, across from rear of J.C. Penney's store. Carpooling is requested. Limited to the first 25 registrants. See checkoff on registration form. Lunch on your own. For more information call Dr. Camp at (419) 537-2398.

Special Acknowledgment

The Ohio Academy of Science and The Medical College of Ohio express their appreciation to the Sun Company, Inc. for partial support of this meeting.

LOCAL ARRANGEMENTS COMMITTEE

Co-Chairs
Richard F. Leighton, M.D.
Vice President for Academic Affairs, and
Dean, School of Medicine

and

Randall Ruch, Ph.D.
Assistant Professor
Department of Pathology

OUR HOST:
ACADEMIC HIGHLIGHTS OF THE MEDICAL COLLEGE OF OHIO AT TOLEDO

The Medical College of Ohio observes its 30th birthday this year. It was created by legislation approved by the Ohio General Assembly and signed into law by then-Governor James A. Rhodes on December 18, 1964. The action was the culmination of studies that began in 1960 when Toledo mayor, Michael Damas, named a citizen committee to determine the need for a medical school in northwestern Ohio. The committee, with strong support from the local medical community, and
business and industry, unanimously agreed on the need, and over the next four years carried the message to the Legislature.

In early January, 1965, the nine-member Board of Trustees named by Governor Rhodes held its initial meeting. Over the next 18 months the Board hired the college's first president, Glidden Brooks, M.D., began hiring staff and faculty, adopted a master plan, and leased what became known as the East Campus at South Detroit and Arlington avenues. The property included Maumee Valley Hospital, its school of nursing dormitory, and the William Roche Memorial Hospital.

There were 158 employees, including 59 faculty members and 10 administrators, on staff when the first class of 32 medical students began studies in the fall of 1969. More than 175 community physicians volunteered their services as teachers.

The master plan called for college development on 346 acres of land acquired in September, 1966, from the Department of Mental Hygiene and Corrections west of the Toledo Mental Health Center between Arlington and Glendale avenues. Construction of the Health Science Building, the first structure on the present campus, began in 1970.

Dr. Brooks, who guided the college during this period in which the School of Allied Health and the School of Nursing were established, resigned in June, 1971. He was succeeded by Marion Anderson, M.D., who served as president from October 16, 1972, to May 23, 1977.

The College's clinical development began under Dr. Anderson and creation of the graduate school was approved by The Ohio Board of Regents July 18, 1975. The Health Science, Mulford Library and Health Education buildings were completed under his administration.

Richard D. Ruppert, M.D., was MCO's third president, holding the office for 16 years, from September, 1977, until his retirement August 30, 1993. During this period the college saw expanding clinical services and patient care, increasing biomedical research activities, expanding academic offerings, and completion of the campus master plan that was approved by the college's first Board of Trustees. This included completion of the Ida Marie Dowling Hall, Medical College Hospital, Facilities Support Building, the Lenore W. and Marvin S. Kobacker Center, the Eleanor N. Dana Conference Center, the Richard C. Ruppert Health Center, the Toledo Hilton Hotel, and the Dorothy and Ashel Bryan Academic Commons.

Under its fourth and current president, Roger C. Bone, M.D. the Medical College of Ohio is charting an aggressive course for future growth and development. Construction will begin soon on a new classroom building for the School of Nursing and the School of Allied Health. And, construction of the first buildings in the Northwest Ohio Advanced Technology Park at the Medical College of Ohio is expected to begin this year. The 233 acre technology park is designed to provide sites for scientifically and technically oriented enterprises.

The college has become one of Ohio's premier biomedical research centers. In 1993, its scientists attracted $13.4 million in research funding, $10 million of which were research grants and contracts awarded by the Public Health Service, primarily from the National Institutes of Health.

Today there are 316 basic and clinical faculty members in the School of Medicine and 73 faculty members in the School of Nursing and School of Allied Health. More than 500 area physicians serve the college as advisers, student preceptors and in other activities.

Since the first class of 32 medical students who graduated in 1972, the Medical College of Ohio has conferred 2,248 doctor of medicine degrees, 125 doctor of philosophy degrees in medical sciences, and 289 masters' degrees in nursing, biomedical sciences, and occupational health. The first class of seven students in the master of occupational therapy program completed their studies in January, 1994.

The school of Medicine currently enrolls 135 students each fall in a four-year curriculum that leads to the Doctor of Medicine degree. The students admitted to the program beginning in fall, 1994, are being selected from 5,178 individuals who submitted applications by the deadline last December 1.

Under the guidance of superb mentors, students pursue classroom, clinical and laboratory work in modern settings with the latest equipment. The curriculum provides students with clinical experiences in campus hospitals and in associated hospitals in Toledo and at sites serving the poor and the homeless. Students also gain one-on-one experiences with physicians and in medical settings in numerous northwestern Ohio communities through the Area Health Education Center programs.

More than 475 students are enrolled in the Graduate School working toward doctor of philosophy in medical sciences, combined doctor of medicine/doctor of philosophy degrees, and master degrees in biomedical sciences, nursing, occupational therapy, and occupational health.

Of the Graduate School students, 134 are studying for the Ph.D. degree; 12 for an M.D./Ph.D.; 55 for master's degree in biomedical sciences; 164 for the master's degree in nursing; 58 in occupational therapy, and 54 for a master of science in occupational health. The Graduate School enrolls about 160 first-time entering students each year.

Through alliances with the University of Toledo and Bowling Green State University, the MCO School of Nursing and the MCO School of Allied Health provide the clinical and professional education for students enrolled in nursing and physical therapy. The college serves as a clinical site for other health professionals enrolled at other institutions of higher education in Ohio.

More than 380 students enrolled in the bachelor of science in nursing programs at the University of Toledo and Bowling Green State University this academic year are taking their professional courses at MCO. An additional 106 registered nurses are enrolled in the BSN program. At the graduate school level, 164 registered nurses with baccalaureate degrees are studying for master of science in nursing degrees at MCO.

Eighty-four students enrolled in the physical therapy programs this school year at UT and BGSU are taking their professional courses in MCO's School of Allied Health.
SYMPOSIUM: Joints in Fine-grained Materials and Contaminant Remediation Strategies in the Ohio Lake Plain and Beyond.
9:30 AM, Friday, April 22, 1994
Defiance
C. Scott Brockman, Presiding

ARRANGED BY: C. Scott Brockman, Ohio Geological Survey, and Coordinator, Division of Earth & Space Sciences, The Ohio Academy of Science; Julie Weatherington-Rice, Bennett & Williams Consulting Geologists
SPONSORED BY: The Ohio Senior Academy of Science Division of Earth & Space Sciences

The PHYSICAL SETTING OF THE OHIO LAKE PLAIN. George Hall, Agriculture Dept. The Ohio State University, 2021 Coffey Rd., Columbus OH 43210.

FRACTURE FLOW IN FINE-GRAINED MATERIALS IN NORTHERN OHIO TWO SITE INVESTIGATIONS. Julie P. Weatherington-Rice and Michael P. Angle, Bennett & Williams, Inc., 2700 E. Dublin Granville Rd., Columbus OH 43231.

For many years, the authors, like many geologists/soil scientists, have noted fractures in fine-grained glacial materials which allowed for rapid water migration in what is typically considered tight formations. In June, 1982, Ms. Rice led a site investigation in conjunction with SSC and OEP in the lake plains at Miller City. Putnam Co where active vertical fractures were found in a basaltic test pit to the depth of almost 20 feet. Water table fluctuations were more rapid than traditional testing methods would indicate at this site. This site investigation resulted in the formation of the Ohio Lake Plains working group which have developed a bibliography of current literature, held meetings and made presentations in 1993 and 1994, including this symposium. In August, 1993, another site investigation, led by Mr. Angle, ODNR, Div of Water, was undertaken in fine-grained materials. Materials at the site were glacial tills and slack-water deposits in an end moraine setting just west of Fowler Woods State Nature Preserve in Richland Co. Backhoe trenches 8-10 feet deep showed vertical fractures 6-8 inches apart at base. Piezometers were installed using McKay et. al (1993) recommendations. Standard tests indicated hydraulic conductivity of materials in the 10-7 to 10-8 range, predicting very slow water movement through the deposits. Actual observations do not support the test results. Surface rainfall events reach installed piezometers in days instead of months or years. Methods for testing the in-situ permeabilities and designs for monitoring the ground water for such sites needs to be re-evaluated.

ORIGIN, DISTRIBUTION AND HYDRAULIC INFUENCE OF FRACTURES IN CLAY-RICH TILLS IN ONTARIO AND DENMARK. Larry D. McKay, University of Tennessee, Dept. of Geologic Sciences, Knoxville TN 37996-1410 and Johnny Fredericia, Geo. Survey of Denmark.

In the extensive clay plains of southwestern Ontario visibly oxidized fractures typically extend to about 6-8 m depth. The fractures are predominantly vertical and are believed to have formed due to desiccation during post-depositional periods of low water table. This is supported by the presence of a stiff crust in the oxidized zone and the absence of prefered fracture orientations in till fabrics. Hydraulic conductivity of this zone is often 2-3 orders of magnitude higher than the underlying clays. Tritt has been found to depths of 13 m or more indicating the presence of hydraulically active fractures below the depth of visible oxidation. The Canadian tills are compared to lodgement tills in Denmark which contain both glacially-induced fractures and post-depositional discontinuous fractures. The two types of fractured till, although of very different origin, have similar hydraulic properties.

THE OCCURRENCE OF JOINTS IN SOME UNSOLIDIFIED CORES IN OHIO. C. Scott Brockman, Ohio Geological Survey, 4333 Fountain Square Dr., Columbus OH 43224.

Twenty-nine continuous cores were evaluated for the occurrence of joints. Joints were defined as near-vertical fractures below the solum with faces apart or loosely joined, generally coated with secondary minerals, illovial materials and rootlets; they are capable of transmitting fluids. In cores of Late Wisconsinan clayey silt north of the Powell moraine (n=19), the range, mean and standard deviation of observed joint depths are, respectively, 7.0-19.1', 12.5', and 6.8'. Joint depths are shallower on ground moraine (mean=11.1', n=12) than on ridge moraine (mean=15.0', n=7). Lacustrine materials of much older Teays age terraces (n=70,000 yr; n=12) have the same mean joint depth as the single core of Late Wisconsinan (<12,000 yr) lacustrine silt, 9.5'. In cores of fluvioglacial materials (n=9), joint depths were present to 11' in a sandy silt not present in a core of silt and medium sand. Stratigraphic position and thickness of sand may control jointing in till in some cases. For example, 2 cores from the Lake Plain with 4-8' of sand over till contain no joints; in 3 cores, joints in tills terminated in the vicinity of sands >12' thick; however, in the 3 cores with thin (few inches) interlayers of sand, joints in till were present above and below the sand. Surface oxidized horizons closely follow joint trends, are more easily identified than joints in core and may sometimes serve as proxy for joint density estimates. The obduction limit is about 1' deeper than the observed limit of jointing. However, buried oxidized horizons, considered possible truncated paleosols, had no evidence of jointing (n=2). Seven paleosols were observed in cores. One of 3 bedrock residual paleosols in shaly soil pitting inferred to be capable of transmitting fluids, as did 1 of 4 paleosols in non-bedrock parent material.

DISCUSSION

LUNCH - ON YOUR OWN

1:30 PM - MITIGATION TECHNOLOGIES

THE IMPACT OF DESICCATION FRACTURES AND RELIC ANIMAL BURROWS ON THE RELIABILITY OF SITE EVALUATIONS AND REMEDIATION; A PCB REMOVAL IN MONTGOMERY COUNTY, OHIO. Michael K. Dalton, Ohio EPA Central District Office, P.O. Box 2198, Columbus OH 43226-2198.

A PCB removal action at a site near Dayton was complicated by migration of PCB contaminated oily sludge in glacial tills in stratified clay. Infilled animal burrows at the site may also have allowed vertical migration. Traditional investigative methods failed to identify the true scope of the necessary removal action. The resulting cost overrun ended the removal action prior to completion. The inadequacy of current investigative methods result in numerous failures to properly remediate sites. French drains used for both observation and remediation are highly recommended in sites where fractures may be present.

CONTAMINANT MIGRATION EXPERIMENTS AND FIELD STUDIES IN FRACTURED CLAY TILLS. Larry D. McKay, University of Tennessee, Dept. of Geologic Sciences, Knoxville TN 37996-1410.

A series of field and laboratory tracer experiments in fractured clay tills in southwestern Ontario and in Denmark show that fractures greatly increase the potential for rapid contaminant migration in fractured clay tills. Migration of solutes is controlled by advective transport through the fractures combined with diffusion into the relatively immobile pore water between fractures. This 'matrix diffusion' processes has profound implications for monitoring and remediation of solutes transported through clay tills because, most of the mass of solutes resides in the diffusion-controlled matrix rather than in the fractures. Migration of colloidal tracers (bacteriophage) which are excluded from the small pores in the blocks between fractures have been observed at rates up to 100 times faster than non-reactive solutes and are of the same magnitude as calculated for fracture flow velocities (m/day). Entry of a dense creosote mixture into a sample of fractured till was found to depend on the fluid properties, the fracture aperture and the injection pressure (or depth of ponded creosote). Field studies of contamination at a hazardous waste landfill and at a transformer storage facility where a PCB-containing DNAPL was spilled are consistent with the experimental studies.

HYDRAULIC FRACCURES TO ENHANCE THE REMEDIATION OF FINE-GRAINED CLAY SEDIMENTS. Larry M. De Werk, Center for Geo-Environmental Science and Technology, Civil Engineering Dept., University of Cincinnati, 1275 Section Rd., Cincinnati OH 45227.

A method of creating hydraulic fractures in soil has been developed and tested at sites underlain by silty clay glacial drift in the Midwest, or by swelling clay in the Gulf Coast region. Most of the 150 fractures created to date were initiated at depths of 1.5 to 5 m and grew away from the point of injection to form gandy dipping features between 6 and 10 m in maximum dimension. The fractures were filled with between 250 and 700 kg of well-coated, coarse-grained sand to create an average permeable thickness of 5 to 10 mm. Hydraulic fractures filled with coarse-grained sand have been used to increase the rate of fluid flow during vapor extraction, bioremediation and liquid recovery from legacy soils. During tests involving vapor extraction, we showed that both the volumetric discharge and the rate of recovery of contaminants from a fracture was approximately 15 times greater than from a control well. The area affected by the fractures combined with diffusion into the relatively immobile pore water between fractures. This 'matrix diffusion' process has profound implications for monitoring and remediation of solutes transported through clay tills because, most of the mass of solutes resides in the cracks, rather than in the fractures. Migration of colloidal tracers (bacteriophage) which are excluded from the small pores in the blocks between fractures have been observed at rates up to 100 times faster than non-reactive solutes and are of the same magnitude as calculated for fracture flow velocities (m/day). Entry of a dense creosote mixture into a sample of fractured till was found to depend on the fluid properties, the fracture aperture and the injection pressure (or depth of ponded creosote). Field studies of contamination at a hazardous waste landfill and at a transformer storage facility where a PCB-containing DNAPL was spilled are consistent with the experimental studies.

DISCUSSION
WORKSHOP: Learning to Drive on the Internet Highway 9:00 AM, Saturday, April 23, 1994

AUGLAIZE

LEARNING TO DRIVE ON THE INTERNET HIGHWAY. ALAN A. HERBERT, DIRECTOR OF ACADEMIC USER SERVICES, INFORMATION SERVICE, UNIVERSITY OF AKRON, AKRON OH 44325-3501.

A lot of attention has been recently focused on the concept of a 'Super Communication Highway.' This highway will allow everyone to communicate with everyone else. A similar highway already exists for many people. This highway is called the Internet. This one hour workshop will help you find out how to access information via this network. Examples of searching for and retrieving research information will be demonstrated. Below is a brief outline of my presentation.

I. What is the Internet?
   A. Who presently has access?
   B. How does one gain access?

II. Tools for Internet access
   A. Telnet - Remote access to computers
   B. FTP - File transfer Program
   C. Lm Demonstration of Information Searches

III. Discussion on how this highway can be used to develop and update a Resource List.

SYMPOSIUM: CERES PRINCIPLES 9:00 AM, Saturday, April 23, 1994

ALLEN

F. John Kluth, Presiding

THE CERES PRINCIPLES: A SUN COMPANY COMMITMENT TO ENVIRONMENTAL ACCOUNTABILITY. MR. TED GRABOWSKI, DIRECTOR OF ENVIRONMENTAL AFFAIRS, SUN OIL CO., 1801 MARKET ST., PHILADELPHIA PA 19103-1699.

In 1993, Sun Company became the first Fortune 500 company to formally endorse the CERES principles; a code of corporate environmental conduct created by the Coalition for Environmentally Responsible Economies. This presentation will describe the history and current status of the relationship between Sun and CERES, the rationale used by Sun to endorse the CERES Principles for Ohio. This symposium is cosponsored by THE OHIO SENIOR ACADEMY OF SCIENCE DIVISION OF ENVIRONMENTAL SCIENCES & RESOURCES MANAGEMENT AND THE OHIO INDUSTRIAL AND BUSINESS COUNCIL.

9:00 THE CERES PRINCIPLES: A SUN COMPANY COMMITMENT TO ENVIRONMENTAL ACCOUNTABILITY. MR. TED GRABOWSKI, DIRECTOR OF ENVIRONMENTAL AFFAIRS, SUN OIL CO., 1801 MARKET ST., PHILADELPHIA PA 19103-1699.

In 1993, Sun Company became the first Fortune 500 company to formally endorse the CERES principles; a code of corporate environmental conduct created by the Coalition for Environmentally Responsible Economies. This presentation will describe the history and current status of the relationship between Sun and CERES, the rationale used by Sun to endorse the CERES principles and the results of Sun's actions to date. In addition, the presentation will discuss the impact that the CERES relationship has had within and outside the company and will list and describe some of the benefits, cost, and issues associated with endorsement.

9:45 A PROPOSAL DOCUMENTING THE VALUE OF THE CERES PRINCIPLES FOR OHIO. F. JOHN KLUTH, NATIONAL MACHINE COMPANY, 4880 HUDSON DRIVE, STOW OH 44224-1799.

The CERES Principles are a model corporate code of environmental conduct promoted by the Coalition for Environmentally Responsible Economies (CERES). This coalition is a non-profit membership organization composed of leading social investors, major environmental groups, public pensions, labor organizations, and public interest groups. These principles include protection of the biosphere, sustainable use of natural resources, reduction and elimination of wastes, energy conservation, risk reduction, production of safe products and services, keeping the public informed, maintaining a management commitment, and maintaining audits and reports. These principles need to be applied to a company in Ohio in a controlled way as a pilot project to determine their effect on the economy, environment, and the development of science in Ohio.

PANEL DISCUSSION
abasin for classroom discussions concerning the changes in pathogenic organization of a two-year period. A multi-media presentation was prepared for students to make observations and generate hypotheses about shoot development. During classroom discussion fundamental anatomical and morphological questions were generated to be used as the basis for independent student laboratory projects. This research and our teaching strategy was designed to improve identified student thinking skills, as well as describe our current understanding of shoot apical development.

**Board E**

**GROWTH RELATED EXPRESSION OF INTEGRIN ALPHASUBUNIT IN HUMAN FIBROSARCOMA CELLS.** DAKWA WANG, MICHAEL G. BRATTAN, AND LUCIE SUN, DEPT. OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, MEDICAL COLLEGE OF OHIO, PO BOX 10008, TOLEDO OH 43699-0008.

The purpose of this study was to explore the effect of cell growth on integrin α5 subunit expression at transcriptional and post-transcriptional levels in human fibrosarcoma HT1080 cells. Integrin α5 mRNA steady state level was increased more than two-fold after release from quiescence. Immunoprecipitation with an anti-α5 monoclonal antibody showed that protein expression was also induced. The increased α5 expression on the cell surface led to increased binding to fibronectin. The induction of α5 mRNA and protein levels in HT1080 cells was due to increased transcription and the responsive cis-element was localized to -292 and -81 with respect to the transcription start site of the α5 promoter. To further investigate the role of integrin α5 in relation to the initiation of DNA synthesis, anti-α5 monoclonal antibody was added to exponentially growing cells and quiescence-released cells. Blockade of FN binding to the α5β1 receptor by the antibody stimulated DNA synthesis in cells released from quiescence but not in exponentially growing cells. These results suggest that integrin α5β1 may act as a negative regulator in cell growth control.

**Board F**

**EXPRESSION OF TGF-BETA ISOFORMS AND THEIR TYPE II RECEPTOR IN THE MCF-7 BREAST CANCER CELL LINE.** KANE WU, LARRY E. GENT, MICHAEL G. BRATTAN, LUCIE SUN, DEPT. OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, MEDICAL COLLEGE OF OHIO, PO BOX 10008, TOLEDO OH 43699-0008.

TGF-β affects cellular proliferation and differentiation primarily through its interaction with its cognate receptor tyrosine kinases. Two major cell surface binding proteins have been identified and designated as type I, II, and III receptors. Type I and II receptors are primarily responsible for TGF-β signal transduction. Quantitative RNAses protection assay and chemical cross-linking were carried out to examine mRNA and protein levels of TGF-β1, β2, and type II receptor (RII) in the MCF-7 breast cancer cell line. MCF-7 parental cell lines showed low levels of TGF-β signal expression while expression of RII mRNA was low. The low level of RII expression was reflected by the resistance of the cell line to the inhibitory effects of TGF-β in proliferation assays. Variations of both TGF-β isoforms and RII expression were observed among different clones obtained by limiting dilution. The present study shows that the mRNA levels of TGF-β1 and II-7 clones will alter TGF-β sensitivity, a tetracycline-controlled transactivator (tTA) dependent promoter was tested for activity and then used in RII cDNA subcloning and expression. Type I and II receptors are involved in the modulation of TGF-β signal in vitro and in vivo. This study demonstrates increased TGF-β sensitivity in MCF-7 RII stable transfection clone. Whether this modulation is due to increased RII expression needs to be further determined.

**Board G**

**EXPRESSION OF TGF-BETA RECEPTOR II IN HUMAN COLON CARCINOMA CELL LINES WITH DIFFERENT SENSITIVITIES TO TGF-BETA.** JENNY WANG, LARRY E. GENT, MICHAEL G. BRATTAN, AND LUCIE SUN, DEPT. OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, MEDICAL COLLEGE OF OHIO, PO BOX 10008, TOLEDO OH 43699-0008.

Transforming growth factor-β (TGF-β) is a multi-functional protein that regulates cell proliferation, differentiation and extracellular matrix expression. It acts by its responses by binding specifically to cell surface proteins. Most cells have three types of TGF-β receptors termed type I, type II, and type III. Type II receptor is an essential for TGF-β signal transduction involving inhibitory responses through its transmembrane serine-threonine kinase. Since different human colon carcinoma cell lines show different sensitivities to TGF-β, we wanted to measure the expression levels of type II receptor in these cell lines to see whether its expression correlates to TGF-β sensitivity. We used an RNAses protection assay to detect in situ mRNAs and cross-sectioning to detect the protein levels of TGF-β receptors. It was found that the cells which are resistant to TGF-β have higher levels of RII mRNA and protein than the cell lines which are resistant to TGF-β. This suggests that type II receptor may play an important role in conferring sensitivity to TGF-β. We are currently transfecting sense type II cDNA expression vector into the TGF-β resistant cell lines in an attempt to restore TGF-β sensitivity of these cell lines.

**Board H**

**MICROBIAL FLORA ON BIRDS: DIVERSITY AND ECOLOGICAL ASSOCIATIONS.** STEPHEN E. KACZ, EDWARD H. BURTT JR, AND JANN M. ICHIDA, OHIO WESLEYAN UNIVERSITY, DEPT. OF ZOOLOGY, DELAWARE, OH 43015.

The microbial flora of the feathers and skin of wild birds is undescribed. We isolated bacteria and fungal samples from birds captured from May 1993 to March 1994. Spore-forming and nonspore-forming rod-shaped bacteria were found along with gram positive cocci bacteria. Among the species we have identified are Bacillus licheniformis, B. subtilis, B. pumilus, E. coli and other coliforms like Staphylococcus sp. We have also identified actinomycetes, Penicillium sp., and Aspergillus sp. Bacteria and fungi were found on the back, stomach, head, wings, and tail. Birds that forage in the air had fewer bacteria than birds that foraged in brush which had fewer bacterial species and a bird that foraged on the ground. Birds with more fungi tended to have fewer bacteria. (Supported by the Ohio Wesleyan University/Howard Hughes program).

**Board I**

**SCANNING ELECTRON MICROSCOPY OF A TREMATODE, COTYLGOSTER AXILLARIS. FOUND IN FRESHWATER MUSSELS COLLECTED FROM HEAD WATERS OF THE CUYAHOGA RIVER, OHIO.** THOMAS B. COLE AND MARTIN K. HUENER, DEPT. OF BIOLOGY, HERALD COLLEGE, HERALD OH 44234.

Freshwater mussels were collected from the head waters of the Cuyahoga River in Geauga and Portage counties, Ohio. Trematodes approximately 2.5mm in length were dissected from the digestive tracts of the mussels, rinsed and placed in isotonic saline at 4°C. The collected specimens were then fixed for 4 hours at 4°C in 2.5% glutaraldehyde. The fixative was prepared with 0.1M Sorenson's phosphate buffer pH 7.2 with 1.0mM sucrose per 100mL of fixative. After primary fixation the specimens were rinsed in fresh buffer at 4°C and post-fixed for 1.5 hours at room temperature. Following a second fixation the specimens were thoroughly rinsed with fresh buffer and placed in 70% ethyl alcohol. The fixed specimens were then dehydrated to 100% with a series of increasing percentages of ethyl alcohol. Alcohol dehydrated specimens were critical point dried (CPD) with liquid carbon dioxide. The CPD specimens were mounted on aluminum stubs with silver paint and sputter coated with palladium. Observations at low magnifications revealed trematodes that were elongate with the mouth located at the anterior end. The mouth was surrounded by a well defined triangular shaped oral disc. An elevated oral cone with attached setae, perhaps cellular debris from the host, was occasionally observed within the oral disc. Most of the trematode was seen as a well-developed posteroventral hood. Most of the trematode was approximately 1/4 the length of the body. A second smaller marginal alveolus was located at each of the anterior and posterior margins. This abnormal mouth was located at the anterior end of each of the marginal alveoli. An opening to a marginal alveolus was observed at the apex of each papilla. In addition, a number of small uncinate osnai papillae were observed along the boundaries of the marginal alveoli. The dorsal surface of the trematodes proved unremarkable except for a single posterior elevation displaying openings to excreryory organs. (This study was supported by the Howard Hughes Medical Institute.)
microscopy (LM and EM). Immunostaining utilized 1st rat α-αx and 2nd goat α-αx, AP conjugated (LM), or 2nd goat α-αx, colloidal gold conjugated (EM). Tissue was soaked after sectioning rather than as whole mounts to avoid permeation problems. Preliminary LM studies show that αx is not distributed apically, but it is still unclear whether or not it is peri-tubularly distributed. EM studies are now in progress and are expected to elucidate the pattern of αx distribution.

**Board M** EXPRESSION OF AMPHIPEGULIN IN HUMAN COLON CARCINOMA CELL LINES. SHUOCHUEN YU, SUZHUKAN AMANAMACHAK, SIVINAS VENTKATESHWARULU, YONG KO AND MICHAEL G. BRATTAN, DEPT. OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, MEDICAL COLLEGE OF OHIO, PO BOX 10008, TOLEDO OH 43669-0008.

Amphipegulin (AR) is a novel growth factor which belongs to the epidermal growth factor (EGF) gene family. It is a glycosylated single chain polypeptide of 78 or 84 AA which has high homology to EGF and transforming growth factor (TGF)-α. AR appears to function in the regulation of tumor growth and differentiation. We have developed a specific antibody to AR mRNAs and its possible relationship with other EGF-related peptides in the tumor development. By reverse transcriptase polymerase chain reaction, a 1024 bp AR cDNA was synthesized from GEO colon carcinoma cell mRNA. A 219 base probe was developed for RNase protection assay to determine the level of AR mRNA expression in colon cancer cells. HCT116 cells transfected with TGF-α antisense cDNA had significantly lower AR levels than nontransfected cells. These cells also had lower EGF receptor and TGF-α mRNA levels than nontransfected cells. This suggests that AR may be modulated by TGF-α in vivo. Currently, studies are in progress to examine the mechanism of action of AR in the regulation of colon cancer cell growth, differentiation and tumorigenesis.

**Board N** DNA MARKERS OF FLOODING TOLERANCE IN SOYBEAN. TAP T. YAN, TAIHUA ZHANG, STEPHEN K. ST. MARTIN, AND SAI-WEI YU. USDA-ARS, SOIL DRAINAGE RESEARCH, 590 WOODY HAYES DR., COLUMBUS OH 43210.

Soybean has been known for its relative lack of polymorphism. This study was conducted to determine the use of RAPD markers to map the flood tolerant loci in soybean. The flooding tolerance of Chinese and U.S. soybeans was determined by both field and simulated laboratory screening tests. Among the Chinese germplasm, Baimongjie showed similar flooding tolerance with Williams and Williams 82 (85% survival). Xu 69-2 showed the highest flooding tolerance at 84% survival, and Dabingxin, the lowest tolerance at 14% survival. Temporal DNA was extracted from soybean leaves using a fast and simple method. Of the 100 oligonucleotide primers screened, 71 produced DNA fragments. However, polymorphism was only detected in the products of 62 primers. Since a total of 141 polymorphic bands were detected, the ratio of polymorphic bands to uninformative bands was 141/62 = 2.29. A total of 14 different plant organs which were either flooded or not flooded produced consistent RAPD fingerprints. The reproducibility of this technique is close to 100% even on minor DNA bands. Crosses between flood-tolerant and -susceptible soybeans were made to map the flooding tolerance genes in the segregating population.

**Board O** INSULIN IN THE RAT STOMACH AND COLON. G. COLIN BUDDO, BEN PANSKY AND MURRAY SAFFMAN, MEDICAL COLLEGE OF OHIO, PO BOX 10008, TOLEDO OH 43669-0008.

The possible presence of insulin in the mammalian gastrointestinal tract (GI) has been ignored. Insulin receptors on the muscular wall of the colon, the production of the other major pancreatic islet hormone, glucagon, by the gut, and its suppression by intraGI insulin in pancreata-proofed dogs, all suggest that insulin is a paracrine agent in the control of glucagon secretion from the same or neighboring GI cells. Can the GI tract synthesize insulin? To search for GI insulin, freshly-extracted GI tissue was used. Two different methods, from different plant organs which were either flooded or not flooded produced consistent RAPD fingerprints. The reproducibility of this technique is close to 100% even on minor DNA bands. Crosses between flood-tolerant and -susceptible soybeans were made to map the flooding tolerance genes in the segregating population.

**Board Q** CONSTRUCTION OF CHIMERIC BETA-LATENCY-ASSOCIATED PEPTIDES. YANGONG WU, DEPT. OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, MEDICAL COLLEGE OF OHIO, PO BOX 10008, TOLEDO OH 43669-0008.

Transforming growth factor-β (TGF-β) is proteolytically derived from the carboxylterminal polypeptide chain of proinsulin. Antibodies specific for porcine insulin, (2) to show the presence in the same cells of preproinsulin mRNA. Conclusion: Epithelial cells in the rat stomach and region of rat pancreatic preproinsulin mRNA. The small intestine does not contain either insulin or preproinsulin RNA. Support by immunoblot and functional activity of these pre-domain chimeras will be assayed by bioassay. We have prepared one such mutant in pCDNA1 expression vector and its results will be presented. The data from these studies should provide chimeric reagents for investigating different models of latency activation.

**Board R** RESPONSES BY ADULT NITIDULIDAE (COLEOPTERA) TO SYNTHETIC AGGREGATION PHEROMONES IN COMBINATION WITH WHOLE WHEAT BREAD DOUGH. R.N. WILLIAMS, D.S. FICKLE, AND M.S. ELISS, DEPT. OF ENTOMOLOGY, OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER OF OHIO STATE UNIVERSITY, 1680 MADISON AVE., WOOSTER OH 44691.

Aggregation pheromones for seven Carpopholus (Nitidulidae) species were tested at the Mohican Fruit Farm during the summer of 1993. The specific pheromones used were: Carpopholus antiquus (Mekhmejian), C. brachypus (Say), C. freemanii (Doocor), C. hemipterus (L.), C. lepidocephalus, C. mulsilus (Erichson), and C. obsolitus (Erichson). Each pheromone was used in conjunction with whole wheat bread dough, an effective attractant. These seven treatments along with the control (whole wheat bread dough without pheromone) were tested for attractiveness. In addition, crossatraction among pheromones was noted. All species responded very favorably to their own pheromone, with the exception of C. obsolitus which was apparently not present in this area. The strongest crossattraction occurred between C. brachypus and C. hemipterus, where, on two occasions, these species responded better to the other pheromone of the other species. C. antiquus also showed some attraction to the C. lugubris pheromone. Other nitidulids such as Steleidota geminata (Say), Glossocholus fasciatus (Olivier), and G. quadrignatus (Say) were also taken in large numbers. The latter three were responding, not to pheromones, but to the bread dough in the traps.


The Killbuck Marsh Wildlife Area was the focus of a seven month survey performed in 1993 to determine the diversity of selected insects. Primary emphasis was placed on three families of Coleoptera: ground beetles (Carabidae), the sap beetles (Nitidulidae), and carabid beetles (Carabidae). Special care was taken to determine if any rare or endangered species were collected in addition to these families, 33 other families of Coleoptera were collected over 200 species were collected and identified. Several trapping methods were utilized at five different sites within the Killbuck Marsh. These included: ultraviolet (black light) traps, flight interception (window) traps, bait traps, fruit bait sampling, and sweep netting. Aside from Coleoptera, several dragonflies/damselflies (Odonata), caddisflies (Trichoptera), butterflies/moths (Lepidoptera), and mosquitoes/midges (Diptera) were also taken. In all, 56 species of ground beetles (Carabidae), 30 species of sap beetles (Nitidulidae), and seven species of carabid beetles (Carabidae) were collected. Six species of ground beetles (Carabidae) were collected, but could not be identified. These species were: Agnus cunicularius (Say), Agnus galvestonensis Casey, Chioglossus nigri Randal, Odemus americanae (Dopran), Scirtinopsis cunea (Chavorn).
Varying dilutions of DMSO in water were used. Results of these experiments showed that DMSO planaria were separated by the tail. Both the planaria and the earthworms received 70% DMSO. Two inches were removed from the posterior end of the second group. The second part of the groups. With the first group of 24 earthworms, one inch was removed from the posterior end. L. terrestris, section was conducted using (earthworms). They were divided into two manners. These results suggest that the reduction of GJIC in rat liver epithelial cells by tumorpromoters reduced dye-coupling ana gap junction number in dose-and time-related fashions. These results were supported the conclusion that the wtsN gene has no effect on the pathogenicity of E. stewartii in corn. Although it does affect the ability of the bacteria to elicit the hypersensitive response. This to the mutation contributes to the understanding of Stewart W. on the most serious disease of sweet corn in the United States. The data is also helpful in the study of the relationship between wts genes in E. stewartii and her genes in several other phytopathogenic bacteria.

The ultrasound will be looked immunofluorescent staining and counting of the junctions. In control cells, approximately 90-110% of junctions were counted. The ultrasound will be looked for this data. A plot of the number of counts per time interval versus the number of times that test takers to a specific ambient odor does have a measurable positive effect on long-term memory. This information contributes to the understanding of Stewart's Wilt, one of the most serious diseases of sweet corn in the United States. The data is also helpful in the study of the relationship between wts genes in E. stewartii and her genes in several other phytopathogenic bacteria.

To test my hypothesis that washing with in-use bar soaps would result in the transfer of microorganisms from the bars to the skin's surface, I cultured bacteria from the bars and the skin's surface before and after washing with the soaps. I then analyzed the cultured bacteria to determine whether or not it was pathogenic and to identify the microorganisms. Multiple trials were conducted over the life of the bars using strict controls. Cultures were made of microorganisms from the bars and compared with those obtained from the skin. Particular attention was paid to ensure that the sources of contamination and the environment in which the bars were placed were typical of a household as opposed to a hospital or health-care facility where pathogenic bacteria may be found in greater quantities. The results indicated that the transfer of pathogenic microorganisms to skin surfaces is a probable occurrence if bar soaps are utilized.

The purpose of this experiment was to discover how the wtsN gene affects the pathogenicity of E. stewartii in corn. Four strains of E. stewartii were constructed, each with different copy numbers of the wtsN gene. These strains were inoculated into corn plants at four different cell concentrations, and three different aspects of pathogenicity were investigated: infectivity, response time, and disease severity. The results showed no statistically significant differences among the strains in infectivity, response time, or disease severity caused by E. stewartii. However, separate experiments showed that the strains clearly differed in their ability to cause the hypersensitive response, a plant defense response. Tobacco. The data supported the conclusion that the wtsN gene has no effect on the pathogenicity of E. stewartii in corn, although it does affect the ability of the bacteria to elicit the hypersensitive response. This to the mutation contributes to the understanding of Stewart W. on the most serious disease of sweet corn in the United States. The data is also helpful in the study of the relationship between wts genes in E. stewartii and her genes in several other phytopathogenic bacteria.

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each participating student for later use in writing the Dean's letter. The students and course directors found the feedback to be useful in evaluation and improvement during the course. Students and course directors in other courses requested that the feedback process be made more non-participatory. Faculty objected to the group setting, some faculty only attended the group sessions. Participants from the two courses. A modified format of the feedback system is now applied to all the basic science courses and extension to the clerkships is being studied.

Board L LINGUAL THRESHOLD RESPONSES IN ARTICULATION DEFECTIVE CHILDREN. LINDA PETROSWO, DONALD FUCII, GUL U NosEWOOD. DEPT. COMMUNICATION DISORDERS, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

This study was designed to investigate possible differences in tactile sensory system function between a group of normal speaking children (M age = 7.6 yr.) and a group of children with articulation problems (M age = 7.5 yr.). The task was accomplished by studying tactile threshold shifts occurring during tasks designed to determine the nature of the data trend. Curvature fitting are utilized. Autocorrelation analysis and stationary testing are also utilized to determine the nature of the data trend.

Board M TIME SERIES ANALYSIS OF EXTREME MINIMUM WINTER TEMPERATURES AT SANDUSKY, OHIO. DENNIS J. EDGELL and ROLANDO SANTOS, BOWLING GREEN STATE UNIVERSITY- FREDLANS ColLEGE, 901 RYE BEACH RD., HURON OH 44839.

The Extreme Minimum Winter Temperature (EMWT) is the lowest daily minimum temperature recorded at a given weather station each winter. This climatic parameter is useful as a measure of winter temperature severity. The smallest temperature of the winter influences the geographic distribution of plants, especially horticultural species and fruit crops. Average EMWT values are often used to map plant hardiness zones, but these zones may change if the EMWT changes over time. Sandusky, Ohio is located along Lake Erie's fruit belt. EMWT's there are generally mild in comparison to the rest of Ohio, however the magnitude of the EMWT varies widely from winter to winter. Furthermore, if global warming is occurring, fruit and ornamental species could be grown at locations further from the lake. Thus, a more lucrative fruit industry is one arguable benefit of global warming! The paper assesses the trend of the EMWT at Sandusky, Ohio in the context of potential climate change. Summary statistics and return period intervals for EMWT are tabulated and presented. Time series methods are used to examine the long term trend since 1883. Graphical plotting methods, moving averages, forecasting and curve fitting are utilized. Autocorrelation analysis and stationary testing are also utilized to determine the nature of the data trend.

Board N THE BEDROCK GEOLoGY OF THE OHIO PORTION OF THE PIQUA 30 X 60 MINUTE QUADRANGLE. GREGORY A. SCHUMACHER, ODNR, DIVISION OF GEOLOGICAL SURVEY, 4383 FOUNTAIN SQUARE DR., COLUMBUS OH 43224.

The Piqua 30 x 60 minute bedrock geology quadrangle, located in west-central Ohio, is the first of a series to be released as part of the cooperative effort between the Ohio Department of Natural Resources, Division of Geological Survey and the U.S. Geological Survey to remap the bedrock geology of Ohio. The Piqua geologic map shows the contacts between six separate rock units of Ordovician and Silurian age and the distribution of the ancient Tensas River valley, tributaries, and drainage divides. The publication also provides a concise discussion of the mapping methods: geologic setting; bedrock, economic, and environmental geology. In addition, open-file mapping products are available for the area of the Piqua 30 x 60 minute quadrangle, including (1) the glacial geology of the region at a scale of 1:250,000, (2) computer-generated structure-contour maps for the top of each mapped unit at scales of 1:250,000 and 1:24,000, (3) a topographic base map at a scale of 1:24,000, and (4) a series of the changes in stratigraphic nomenclature over the last 150 years. The Piqua 30 x 60 minute bedrock geologic quadrangle and associated open-file products will help the citizens of Ohio plan the development and utilization of the land and its mineral resources, ground water, and fossil fuels in a manner that achieves environment balance and minimizes the impact of geo-hazards.

Board O DESIGN PRINCIPLES FOR DEVELOPING USER-FRIENDLY GRAPHICAL USER INTERFACES. SUMANTH MADIMSETTY, DEPT. OF COMPUTER SCIENCE AND ENGINEERING, UNIVERSITY OF TOLEDO, TOLEDO OH 43606.

It is not often that we find a software application without a graphical user interface (GUI). A GUI is defined as an interface which operates on windowing environments, has pull down menus and can be controlled by a mouse. It is widely accepted fact that GUI's are much more convenient to use than command level interfaces. However, it has been noticed that the GUI's are often difficult to use. To put it in word, the GUI's have become less user-friendly. This paper brings out design principles which can be used for designing user-friendly GUI's. User Testing has been performed on several software packages to find out specific areas where users tend to commit more errors and also isolate specific tasks which users find difficult to complete. A formula to assess relative usability and give numeric grading to these interfaces is also developed. Through user testing I have developed data on the effectiveness of specific design principles, which might be used by designers to design user-friendly GUI's.

POSTER SESSION
02:00 PM, Saturday, April 23, 1994 Dana-Hilton Connector

Board A WOOD DENSIFICATION. ROBERT L. RONG, GREG P. GORDON. SCHOOL OF NATURAL RESOURCES, OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER, 1680 MADISON AVE., WOOSTER OH 44691.

A low cost prototype wood densification machine has been designed and constructed using compacting ram technology. The machine produces a briquette from solid wood generated by secondary wood manufacturing companies. The prototype machine is capable of producing a briquette four inches in diameter and approximately four inches thick using hydraulic pressure only (no binders). The briquettes were evaluated for durability, density and heat value. Briquette quality was also evaluated based on raw material moisture content, particle size, species and compression pressure. Briquettes made with higher compression pressures had greater durability. Raw material moisture content was the most sensitive variable evaluated. Critical raw material moisture content ranged between seven percent and eighteen percent (dry weight basis). Briquettes made from raw material outside the critical range resulted in low durability and low heat value. Briquette durability was not affected by raw material particle size or wood species. Briquette density was dependent on compression pressure and particle size.

Board B LONG-TERM EFFECTS OF ENRICHED CARBON DIOXIDE (CO2) AND OZONE (O3) ATMOSPHERES ON ELM LEAF BEETLE (ELB) PERFORMANCE. J. H. BARBER, W. N. CANNON, JR., USDA FOREST SERV., 359 MAIN RD., DELMARWA, DEPT. ENTOMOLOGY, OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

The effects of doubling atmospheric CO2 during the next century, in the presence of other pollutants (O3), may alter insect/plant interactions causing an increase in frequency and severity of pest outbreaks. Elm trees were fumigated with either ambient air (AA) at 1X, enriched CO2 at 1X and 2X, or both (1X/2X) for 1982-88. Cumulative seasonal doses were 95 (116), 97 (118), 195 (197) ppm hr and CO2 doses were 1061 (1276), 1852 (2252), 1038 (1270), and 1929 (2227) ppm.hr for AA, CO2 0, and CO2 + O3, respectively. Assays were conducted on leaf tissue for nitrogen and H2O content. ELB bioassays were conducted in petri dishes for leaf area consumed, fecundity, and mortality and in insect cages on elm branches for fecundity. Experiments corresponded to two ELB generations each year. For both years, elm fumigated with CO2 and CO2 + O3 had significant decreases in nitrogen and H2O content. In 1992, elm growth increased for CO2 and CO2 + O3 but was unaffected in 1993. Leaf area consumed and fecundity of ELB varied between years. Leaf ethylene evolution and ELB mortality were unaffected. Findings will provide basis for regional/national management and policy decisions regarding forest ecosystems and global change.

Board C APPLICATION OF THE INDEX OF BIOTIC INTEGRITY TO BUCK CREEK AND MILL RUN, CLARK COUNTY, OHIO. ALIZE A. ABSORBEE, GREGORY C. ANTELMAN, AND JOSH HUTSON, DEPT. OF BIOLOGY, WITTENBERG UNIVERSITY, P.O. BOX 729, SPRINGFIELD OH 45501-0720.

Sections of Buck Creek downstream from C.J. Brown Reservoir and one of its tributaries, Mill Run, in Clark County were sampled by electroshocking beginning in the fall of 1993 in order to assess the biotic integrity of these lotic systems. Criteria for site determination were current velocity, water depth and location from pollution sources. Buck Creek Site was chosen in relation to the confluence of Mill Run and Buck Creek. Sites on Mill Run were upstream and downstream of a known industrial pollutant effluent. Physicochemical parameters were measured at each site and remained relatively constant between localities. Index of Biotic Integrity (IBI) values were assigned for fish taxa based on their taxonomic position and similarity indices. Results show that pollution in Mill Run has a detrimental effect on downstream fish communities, and IBI and Species richness values are higher in those locations upstream from point-source inputs.


We attempted to examine the relationship between the density and distribution of the white-footed mouse (Peromyscus leucopus) and the distribution of the blood parasites Trypanosoma musculi and Trypanosoma lewisi at Hiram College's J.H. Barrow Field Station. Three live-trapping sites were established in a late-successional beech-maple forest, and one site was established in a 25-year old-field. Nest boxes were also constructed and placed in a variety of woody habitats. The traps and nest boxes were checked twice-weekly from 18 June through 2 October, 1993. A drop of blood was taken from the tail of each captured animal, and
A major limitation with the anti-cancer drug taxol is that it is found in miniscule quantities in the bark and needles of yews. Because Taxus extracts have anti-herbivore properties, and it has been shown that simulated herbivore damage increases levels of other terpenes, we hypothesized that herbivory may induce higher levels of taxanes (e.g. taxol and baccatin III). To test this hypothesis insect herbivory was simulated by cutting into the bark of 2 yr old Taxus media Hook at 1 mm deep and 5 mm intervals. In a second treatment at 0.1 concentration of 2,4-D in lanolin was applied to the bark, which was then cut with a razor as above. A control group was left unmanipulated. Extraction procedure followed Auriola, Lepisto, and Naaranlahti (1992) and quantification of taxanes was accomplished using an HPLC. We found that cutting significantly increased taxol concentrations, but cutting plus 2,4-D resulted in concentrations not significantly different than the control. Baccatin III was not significantly affected by cutting but was reduced by 2,4-D application.

**Board B** MICROMALAB FLORA ON BIRD S: COLONIZATION OF NESTLINGS. Jennifer L. Fussman, Dept. of Zoology, Ohio Wesleyan University, Delaware OH 43015.

The microbial flora of birds is poorly described and bacterial colonization of nesting is unknown. I collected bacterial samples from nestling tree swallows (Tachycineta bicolor) and eastern bluebirds (Sialia sialis) from nesting through fledging. I also sampled nesting adults of both species and 1st and 3rd year fledglings. The level of taxol and taxane production of 20 specimens of both species was measured by HPLC. The results showed that both species, independent fledgling tree swallows, and nests of both species. Newly hatched individuals indicated earlier successional status. Another area, in which chestnut (Castanea dentata) was previously a major component, is now dominated by red maple, with a large percentage of cucumber magnolia (Magnolia acuminata). Bray-Curtis ordination using Euclidean distances supports these observations. We gratefully acknowledge grant support from the Howard Hughes Medical Institute.

**Board C** RESPONSE OF GYPSY MOTH LARVAE TO MULTI-YEAR EXPOSURE OF WHITE OAK TO CO-ENRICHED ATMOSPHERE. W. N. Cannon, Jr., J. H. Barger, USDA Forest Serv., 359 Miami Rd., Delaware OH 43015; and R. W. Hall, Dept. of Entomology, Ohio State University, Columbus OH 43210.

Elevated CO levels may alter foliage qualities that affect insect herbivore food consumption and growth. We evaluated gypsy moth (Lymantria dispar) pupal weight after the larvae (from the 2nd instar on) had completed their development on foliage of 8-yr-old white oak (Quercus alba) trees fumigated from May to Oct. 1982 and from May until pupation in July 1993. Fumigation treatments were ambient air or ambient air plus 2X ambient CO concentration (ca. 850 ppm CO) for 7 hrs/day. Each year, leaf and total abdominal weight were determined for each treatment at the time of pupation and related to pupal weight. For both years, we found that leaf nitrogen and water contents per unit of leaf dry weight were significantly less in elevated CO-treated foliage. Nitrogen content was reduced ca. 15% and water content was reduced ca. 4% under this treatment. Gypsy moth pupal weight for both sexes was similar for the ambient and 2X ambient CO treatments, although variance was greater in 1983, the second year of this study. We concluded that the larvae were able to compensate for differences in leaf nutritional factors produced by these treatments.

**Board D** EFFECTS OF DIAZINON ON MACROPHAGES OF KIDNEY AND SPLEN OF BLUEGILL SUNFISH, LEPOMIS MACROCHIRUS. Naguen Oguri and Hirun M. Dutta, Dept. of Biological Sciences, Kent State University, Kent OH 44242.

Effect of diazinon on the macrophages of the spleen and kidney were investigated in the bluegill sunfish, Lepomis macrochirus. A total of 12 bluegills were used; two from each concentration of 15, 50, 45, 60, and 75 μg/L. Duration of exposure was 24 hr. A control of 10 fish were maintained in the same environment without diazinon. After 24 hr, fish were necropsied and MS-222, then the kidney and spleen were removed. The tissues were then examined for microscopic abnormalities and fixed using Perls’s method for ferric ion staining for macrophages. The fixed slides were then viewed using a light microscope and pictures were taken of the macrophage populations. Kidney in control fish showed one agglutination of 3.4 μm (normal level); 15 μg/L one agglutination of 5.4 x cm, 30 μL/3 clumps averaging 2.6 x 3 cm; 45 μg/L one clump of 7 x cm, 60 μL/1 clump of 5.8 x cm; and at 75 μg/L, 2 agglutinations averaging 1.5 x 5 mm in size. Spleen under control showed 2 clumps averaging 5.5 x 5 mm; 15 μg/L, one clump of 1.8 x 1.2 cm; 30 μg/L, numbers averaging 3.4 x 0.3 x 0.4 cm; 45 μg/L, 2 clumps averaging 6 x 0.8 cm, 60 μL one cluster of 3 x 2 cm; and at 75 μg/L, 4 clumps were evident averaging 1.0 x 0.8 cm. Kidney exhibited a slightly increased macrophage population in the increase in diazinon concentration whereas the spleen there was an increase in macrophage population up until 60 μg/L. A decline was evident in the 75 μg/L concentration. This study reveals that the fish’s immune system (macrophage population) increases up to a certain level of toxin (60 μg/L) diatizone) followed by a decline with the increased level (75 μg/L) of diazon. This makes the fish susceptible to other diseases, causing eventual death.
The asymmetric nitrosamine, N-nitrosomethylbenzylamine (NMBA), has been utilized by many investigators to study the tumorigenicity of NMBA following various treatment protocols. In the present study, strains A/J and C57BL/6 were treated with NMBA and benz(a)pyrene-dihydrodiol. From these data we were able to deduce a critical region of about 1 cM as the likely location of a putative tumor suppressor gene. We performed loss of heterocigosity studies on F1 hybrid mouse lung tumor lines to further map the most frequently deleted region on chromosome 4. Tissue previously embedded in paraffin can be dewaxed and reprocessed into Spurr with no loss of immunoreactivity. In addition, plastic sections can be efficiently immunostained on an autostainer.

Previous studies in our laboratory showed that treatment of cultured rat esophageal epithelial cells (REEC) with NMBA or BP-DHOD led to their neoplastic transformation. This study was undertaken to determine if chemically transformed REEC have mutations in the p53 suppressor gene. Mutations were analyzed by single-strand conformation polymorphism analysis of Pst I-digested genomic DNA and direct DNA sequencing of exons 5-7 and exon-intron junctions. A single base deletion of one cytosine in codons 174-176(TGCCCCAC→TGCCCCAC) was found in the REEC transformed by both carcinogens. There was a correlation between this deletion in the p53 gene and tumorigenic potential of the transformed REEC in newborn syngeneic rats. In addition, by immunocytochemical analysis using monoclonal antibodies (Pa6421 and PA240), we found no expression of p53 protein in the transformed REEC. These results suggest a good correlation between deletion and abnormal expression of the p53 gene in rat esophageal epithelial cells transformed by NMBA and BP-DHOD. Also, the C97-rich codons 174-176 in the p53 gene may be a target for both N-nitrosomethylbenzylamine (NMBA) and benz(a)pyrene-dihydrodiol.

Infectious agents, including bacteria, fungi, and protozoans, can be clearly identified in Spurr-embedded tissue sections. Comparing the results with corresponding paraffin-embedded tissue sections reveals that the resolution is superior in plastic, thereby, providing the pathologist with significantly improved image information for identification. Tissues previously embedded in paraffin can be dewaxed and reembedded in Spurr, resulting in the same improved resolution of the infectious agent. The two main objections to routine plastic embedding of small endoscopic and bone marrow biopsies are: 1) immunohistochemical procedures are difficult to perform reliably and consistently, and 2) specific etiological agents such as mycobacteria or fungi cannot be detected. We and other authors have demonstrated that immunologic reactions can be carried out in plastic embedded sections with consistent and reliable results even when they are processed by a computerized robotics system. The results presented in this paper show the high-resolution achieved in plastic.

**POSTER SESSION**

3:00 PM, Saturday, April 23, 1994 Dana-Hilton Connector

**BOARD A**

**AN EVALUATION OF ESOPHAGEAL TUMORIGENICITY IN MALE F344 RATS FOLLOWING TREATMENT WITH N-NITROSOBENZYLAMINE.**

Jospeh C. Clonin and Gary D. Stoner, Medical College of Ohio, Dept. of Pathology, 3000 Arlington Ave., Toledo OH 43699.

The asymmetric nitrosamine, N-nitrosomethylbenzylamine (NMBA), has been utilized by several investigators to induce esophageal tumors in rats. While many studies have focused on the histogenesis of NMBA-induced tumors, no single, systematic study has been undertaken to assess the tumorigenicity of NMBA following various treatment protocols. In the present study, 21 groups of 30 male rats received NMBA at cumulative doses of 6, 7.5 or 10 mg/kg. These dosages were achieved in 1 to 6 individual injections, given over a period of 1 to 2 weeks. An additional group received a cumulative NMBA dosage of 7.5 mg/kg, given in 15 s.c. injections over 5 weeks. Six 5-MeC-DNA adducts were observed, with one major adduct and five minor adducts. The six adducts were detected in only 1 of 19 of the C3A, 0 of 20 of the AC3, 0 of 19 of the AC3, and 0 of 2 of the CDF lung adenomas analyzed. In most cases the losses appeared to occur by nonsense mutation. In ten carcinomas we observed incomplete losses that overlapped at SSLP marker D4M1T77, which is ~1 centi-Morgan (cM) distal to the IFN-alpha gene cluster. Moreover, three of these tumors had interstitial deletions involving only this marker. From these data we were able to deduce a critical region of about 1 cM as the likely domain of a novel tumor suppressor gene on mouse chromosome 4.

**BOARD E**

**TUMOR MULTIPLICITY, DNA ADDUCTS AND K-RAS MUTATION PATTERN OF 5-METHYLCYCLORENSE IN STRAIN AJ MICE.**


5-Methylchrysene (5-Mc) is found in tobacco smoke and in the atmosphere. This study was undertaken to evaluate the tumorigenic potential of 5-Mc in strain AJ mouse lung, and to correlate the 5-Mc DNA adduct profile in lung tissue with the mutation spectrum in the K-ras oncogene. Strain AJ mice were treated with 5-Mc and their lungs were collected for DNA adduct analysis. Lung tumor multiplicity and the K-ras mutation pattern in the lung tumors were determined at eight weeks after 5-Mc treatment. 5-Mc was found to be a potent inducer of lung tumors in strain AJ mice. Moreover, these tumors had intestinal deletions and K-ras mutations. Six 5-MeC-DNA adducts were observed, with one major adduct and five minor adducts. The major adduct exhibited a chromatographic mobility consistent with a nonpolellar adduct. A minor adduct comigrated with the standard NF-deoxyguanosin adduct of 5-Mc-deoxyolipid I. Characterization of the 5-Mc DNA adducts is currently underway. A K-ras mutation spectrum contained a high proportion of G→T transversions, a mutation consistent with the formation of deoxyolipid adducts. This abstract does not necessarily represent policy of the U.S. EPA.
SPONTANEOUS MOUSE LUNG TUMORS. Y. WANG and M. Y. YOU, MEDICAL COLLEGE OF OHIO, TOLEDO OH 43699.

Previous studies have shown that the K-ras gene is alternatively spliced into two distinct transcripts and both contain the first three exons and either of the fourth exon, exons 4A or 4B. These two alternatively spliced K-ras transcripts, K-ras 4A and K-ras 4B were co-amplified by RT-PCR and were co-immunoprecipitated with the K-ras specific antibody. The level of K-ras RNA was expressed about 10-fold higher than that of K-ras 4B. Both K-ras and K-ras 4A transcripts contained the same activating mutation in the K-ras gene in a given cell line. These results indicate that K-ras 4B RNA is the major transcript of the K-ras gene in NIH3T3 cells.


Mouse liver tumor incidence varies markedly among inbred strains of mice. Analysis of liver tumorigenesis in recombinant inbred strains suggest that the genetic hepatocarcinogenesis susceptibility (Hcs) loci are involved in the liver tumor susceptibility in these mouse strains. However, the identity of Hcs genes has not been identified. In this study, we used AP-PCR to identify the candidates of Hcs genes. Total RNA from liver of the strains of AJR, ABR, Balb/c, C57, C57B1, DBA/2, Mus spretus, SJL, and SWR strains of mice were isolated and the first-strand cDNA was synthesized by reverse transcription reaction with an arbitrary oligonucleotide primer. The cDNA was amplified by polymerase chain reaction (PCR) with the same primer. The PCR product was end-labeled with ^32P and fractionated on a denaturing polyacrylamide gel. Several unique fragments were found only in the liver cDNAs of susceptible strains while many unique fragments were only observed in the liver cDNAs of resistant strains. Currently, these fragments are being cloned and sequenced. These clones will be used for the screening DNA library to identify the Hcs genes.

BOARD H EXPRESSION OF TRANSFORMING GROWTH FACTOR ALPHA IN NORMAL, PRENEOPLASTIC AND NEOPLASTIC EPITHELIUM OF RAT ESOPHAGUS. Q.-S. WANG, N. BURD, FRED. M. ROBERTSON, LEENA KHIARE AND GARY D. STONE, DEPT. OF PREVENTIVE MEDICINE, OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

Transforming growth factor alpha (TGF-α) is a 50 amino acid polypeptide which has mitogenic activity mediated through interaction with epidermal growth factor receptor (EGF-R) and is believed to be an activator of a tyrosine kinase dependent mitogen-activated protein. The goal of this study is to correlate the expression of TGF-α in esophageal epithelial tissue isolated from rats treated with N-nitrosomethylbenzylamine (NMBA), using immunohistochemical techniques. TGF-α staining was prevalent within the cytoplasm and supranuclear area of cells in preneoplastic and neoplastic lesions; in tissue isolated from NMBA treated rats compared to the low levels of TGF-α detected in control tissues. TGF-α immunoactivity was confined to the differentiated cell compartment in normal tissues. However, in preneoplastic and neoplastic tissues, there were proliferating cells that stained with TGF-α specific antibodies. The proliferating cells were detected by immunohistochemical staining of proliferating cell Nuclear antigen (PCNA) and the number of PCNA positive cells were increased in both neoplastic and preneoplastic tissues and was significantly greater than the number of proliferating cells in normal tissues. This observation suggests that production of TGF-α may play a role in esophageal tumorigenesis in this model, and TGF-α may modulate both basal epithelial cell differentiation as well as mitogenesis.


HCT116 cells have an intracrine Transforming Growth Factor-α (TGF-α) loop, whereas CBS cells have an extra cellular autocrine loop. We compared the control of TGF-α expression in these cells to determine whether the inaccessibility of autocrine TGF-α in HCT116 cells reflects different mechanisms for its control. The presence of EGF enhances the release of TGF-α into conditioned medium. Both HCT116 and CBS cells released 2-3 fold higher levels of TGF-α when cultured in conditioned medium supplemented with transferrin (T), insulin (I) and EGF (E). The cloning efficiency of well differentiated colon carcinoma cells in limiting dilution experiments was dependent upon the presence of all three factors but once exponential growth was achieved EGF was not required for growth. TI is required for mitogenesis induction of a tyrosine kinase signal transduction pathway. The goal of this study was to determine the relative importance of EGF and the synthesis of each factor. The level of TGF-α secreted was 2-3 fold higher in the medium than in T medium. TGF-α mRNA level was also 2-3 fold higher. CAT assay showed that expression was also increased 2-3 fold by EGF in the culture medium. Using heterologous promoter assays and gel shifts assay a novel EGF responsive DNA element has been found.
0.075% (v/w) IPO for 8 wk. During wk 4, 5, and 6 IPO was added to the diet (0.01%, v/w). Using the RP-postlabeling assays, IQ DNA adducts were isolated from organs 1-2 d after the last day of feeding IQ. At the various time points (1, 2, 4, 6, 8, 12 d) the presence of IPO in the diet reduced total adduct formation, amounting to a 33.6-41.8% decrease in the liver, 35.7-91.8% in the lungs, and 17.6-61.5% in the stomach. In addition, animals on the IPO diet showed an accelerated rate of adduct removal from the lungs and stomach, but not from the liver. It is concluded that dietary IPO inhibits IQ-DNA adduct formation in target organs of the male C57, mouse and accelerates their removal from the lungs and the stomach.

**B.** **INDUCTION OF GAP JUNCTIONAL INTERCELLULAR COMMUNICATION IN HUMAN MYOMETRIAL CELLS BY ESTROGENS.**

MARGA D. SMITHERS AND RAMDALL J. RUCH, DEPT. OF PATHOLOGY, MEDICAL COLLEGE OF OHIO, 3000 ARlington AVE., TOLEDO OH 43614.

Gap junctional intercellular communication (GJC) between uterine smooth muscle cells (myometrial cells) is necessary for the development of coordinated contractions during labor.

**C.** **MYOMETRIAL GAP JUNCTION PROTEIN (CONNEXT32 AND CONNEXT62) IN CULTURED RAT LIVER EPITHELIAL CELLS.**

WING REN AND RANDALL J. RUCH, DEPT. OF PATHOLOGY, MEDICAL COLLEGE OF OHIO, 3000 ARlington AVE., TOLEDO OH 43614.

**D.** **LINDANE-TREATED RAT LIVER EPITHELIAL CELLS.**

XIAODAN GUAN AND RANDALL J. RUCH, DEPT. OF PATHOLOGY, MEDICAL COLLEGE OF OHIO, 3000 ARlington AVE., TOLEDO OH 43614.

Lindane, a neurotoxicant, liver tumor promoter, and embryotoxicant, inhibits gap junctional intercellular communication (GJC) in vitro. We now report that the mechanisms of inhibition are dependent upon treatment duration. Short treatment times (10-30 min) with lindane (10-50 µM) inhibited gap junction permeability (assayed by microinjection of fluorescent dye), in WB-F344 rat liver epithelial cells but had no effect on gap junction number (assessed by anti-Cx43 immunostaining) or Cx43 expression (assayed by northern and western blot). Longer treatment times (1-4 h), however, resulted in decreased gap junction permeability, gap junction number, and phosphorylated forms of connexin43, but no effect on Cx43 mRNA levels. Extended treatment (1-4 d) significantly reduced gap junction permeability, gap junction number, and connexin43 protein and mRNA levels. These studies demonstrate that a toxic agent can have multiple mechanisms of action on GJC depending upon treatment duration. (Supported by NCI-CA57612).
A glycosaminoglycan (GAG) lining, coating the cells of the superficial layer of the urothelium has been proposed by several researchers. It has been hypothesized that this layer functions as a barrier against bacterial infections. We used a variety of histological techniques employed by individual investigators to identify this lining. These techniques include alcian blue (AB)-nuclear fast red (NFR), colloidal iron (CIFNR) and Van Gieson's solution (VGS), periodic acid Schiff (PAS), and alcian blue/methyI yellow and tetrazaine. Despite our continued efforts, we were unable to locate a continuous lining using these techniques like previous investigators. Although, we occasionally observed a patchy distribution of mucin on the superficial cells of the urothelium lining, using magnesium chloride in buffered alcian blue, we were able to identify a continuous layer of glycosaminoglycan on the surface of the superficial layer. In addition, we observed that the umbrella cells of the superficial layer as well as the other layers of the urothelium secrete a significant amount of mucin. This mucin appears to have properties that are different from glycosaminoglycans. Observations show that surface GAG lining cannot be identified by using conventional techniques. (Supported by kidney Foundation of NWO).

The SLIDE AGGLUTINATION technique and the Enzyme-Linked Immunosorbent assay in the Subspeciation of P. aeruginosa. ANGELA N. PAYTON, ROUDBEH JARASMI, DEPT. OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, OHIO 43403.

The slide agglutination technique is a method generally used to serotype P. aeruginosa strains using rabbit polyclonal antibodies. This method is cumbersome, expensive, and is not utilized in clinical laboratories. The objective of this study was to determine whether the ELISA method using specific monoclonal antibodies (mAbs) has an advantage over the slide agglutination technique. Three hundred strains of P. aeruginosa were obtained from St. Rita’s Medical Center, St. Vincent’s Medical Center, and The Toledo Hospital. All strains were identified by standard microbiological methods. Rabbit polyclonal antibodies, for slide agglutination, were purchased from DIFCO laboratories. The mAbs were produced in our laboratory. Results of the two methods correlated well, however, some limitations were observed with the slide agglutination method. The necessity of a high concentration of antibody (1:10 dilution) for the slide agglutination versus 1:400 dilution for the ELISA. The ELISA method using mAbs appears to be superior in serotyping P. aeruginosa strains.

The catalytic subunit of protein phosphatase type 1 (PPY1), in yeast Saccharomyces cerevisiae, is encoded by the GLC7 gene and plays a major role in the regulation of glycolysis and aerobic metabolism. In order to obtain sufficient amounts of the enzyme to carry out characterization studies, the GLC7 gene was expressed in E. coli. Expression of PPY1 was in the pET15b vector which makes use of the T7 promoter. However, the enzyme was expressed as an insoluble aggregate. It has been shown that other workers involved with the expression of mammalian phosphatase type 1 that inhibited-2 is required for the expression of properly folded, soluble catalytic subunit. Using the same approach, the yeast PPY1 was expressed along with mammalian inhibitor-2 which was fused to glutathione transferase. The expression resulted in a small fraction of PPY1 being expressed in an active, soluble form. Experiments to improve the expression of soluble enzyme are in progress. Chickens were injected with the yeast PPY1 expressed in E. coli and the resulting antibodies were purified from serum. The purified antibodies could be used to detect PPY1 in yeast extracts by western blot.

The GLC7 gene of the yeast Saccharomyces cerevisiae encodes a protein (PPY1) very similar to the catalytic subunit of mammalian protein phosphatase type 1. This protein was...
overexpressed as a glutathione transferase (GST) fusion protein by subcloning the gene into an expression vector (pEGST) and the fusion protein was partially purified using a glutathione-agarose affinity column. However, its specific activity was only about 0.05 U/mg compared to that of mammalian phosphatase 1 which is about 10 U/mg. This may be due to incorrect protein folding. Our experiment recently shows that inhibition of 2, which is a 23.3 kDa protein that specifically inhibits protein phosphatase from many sources, can inhibit PFY1. Therefore, expression of the yeast phosphatase and a fusion protein containing GST fused to mammalian phosphatase inhibitor-2 was carried out. A complex of PFY1 and the fusion protein has been purified from the yeast crude extract and its phosphatase specific activity is about 7 U/mg. Isolation of the yeast phosphatase from the complex and further characterization of this protein is being carried out.

**Board K**

**EXPRESSION AND ACTIVATION OF C-TERMINAL MODIFIED GLC7 IN SACCHAROMYCES CEREVISIAE.** GUANG HONG AND EMMANUEL M. REMANN, DEPT. OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, MEDICAL COLLEGE OF OHIO, TOLEDO OH 43699.

The yeast GLC7 gene encodes a type 1 protein phosphatase. The amino acid sequence of GLC7 is highly homologous to the mammalian phosphatase 1. Previous studies showed that co-tap and tryptic treatment activates GLC7 in vitro and trypsin cleaves the C-terminal region of GLC7 during this process. To understand how trypsin activation occurs, a C-terminal truncated GLC7 has been constructed to mimic the C-terminal cleavage by tryptic treatment. This mutant is constructed by oligonucleotide directed mutagenesis using PCR to introduce a stop codon at Arg-304 and a restriction site after the stop codon. This truncated form of GLC7 and other C-terminal mutants will be expressed in both E. coli and S. cerevisiae. To purify GLC7 and its regulatory subunits, a C-terminal poly-His tagged GLC7 has been constructed and expressed in E. coli, but the protein is insoluble. This poly-His tag, which is attached to the Arg-304 of GLC7 by a pol-His spacer, will allow easy purification on immobilized Ni²⁺-columns. Since trypsin may cleave the C-terminal region of GLC7 during activation, this C-terminal tag is expected to be released during tryptic activation.

**Board L**

**STRUCTURE AND FUNCTION STUDIES OF GLYCYL- tRNA SYNTHETASE.** HONG WU, JOHN DAVID DONOHAN, MEDICAL COLLEGE OF OHIO, DEPT. OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, 3000 ARLINGTON, TOLEDO OH 43614.

The aminomethyl-tRNA synthetases play a crucial role in protein biosynthesis by specifically charging tRNA with their cognate amino acids. Glycyl-tRNA synthetase from B. mori has been expressed in E. coli. To study the function of specific domains and to identify tRNA binding and catalytic regions, truncated forms for the enzyme were constructed. Four deletions from C-terminus were expressed which contain 649, 627, 524 and 359 residues. All are soluble but lacked aminomethyl-tRNA synthetase activity. Deletion of a 55 residue N-terminal sequence with similarity to sequence found in some other tRNA synthetases, results in an enzyme with altered tRNA synthetase activity, but with reduced pyrophosphate exchange activity. Because these enzyme tRNA synthetase hybrids have altered tRNA synthetase activity, GLC7 appear to be the active site, an expression vector constructed directed the synthesis of a hybrid protein containing the presumptive adenylate forming site from threonyl-tRNA synthetase and appears to be the active site, an expression vector constructed directed the synthesis of a hybrid protein containing the presumptive adenylate forming site from threonyl-tRNA synthetase and the presumptive RNA binding site from glycyl-tRNA synthetase. The chimeric enzyme should charge glycyl-tRNA with threonine. The protein expressed in E. coli is intact and soluble, a very heavy and insoluble protein contains the presumptive adenylate forming site from threonyl-tRNA synthetase and the presumptive RNA binding site from glycyl-tRNA synthetase.

**Board M**

**THE CHARACTERIZATION OF POLY-HISTIDINE TAGGED CYCLIC-AMP DEPENDENT PROTEIN KINASE.** SCOTT R. DALTON, SUSAN DONNAN, PH.D., EMMANUEL M. REMANN, PH.D., DEPT. OF BIOCHEMISTRY AND MOLECULAR BIOLOGY, MEDICAL COLLEGE OF OHIO, TOLEDO OH 43699.

Cyclic-AMP dependent protein kinase is an iconic enzyme that regulates many physiologic events. The kinase is composed of four subunits, two regulatory and two catalytic subunits. When the subunits are combined, they form an inactive holoenzyme. The binding of four cAMP molecules activates the kinase by causing the release of the two functional catalytic subunits. The mouse catalytic subunit was expressed in E. coli using the PET-1 transfer plasmid vector. This was done in order to obtain an N-terminal pol-histidine tagged enzyme for rapid purification using immobilized Ni²⁺-columns. Since the tag has a strong affinity for the Ni²⁺-column, the poly-histidine catalytic subunit binds to the column, and can be eluted with 1M imidazole. Km values were determined for the substrates kemptide, ATP, histone and casein in purification using immobilized Ni²⁺-columns. Km values were determined for the substrates kemptide, ATP, histone and casein. The physiological role of either enzyme is not known. We have compared the activity of either enzyme in yeast and E. coli.

**Board N**

**COMPARISON OF THE GROWTH OF WILDC Type and PROTEIN KINASE DELETION MUTANT HERPES SIMPLEX V. 1 TYPE 1 IN several CELL TYPES.** MONICA J. JONES AND DWIGHT G. WALCOTT, UNIVERSITY OF IOWA, DEPT. OF BIOLOGY, IOWA CITY IA 52242-3908.

The genome of herpes simplex virus type 1 (HSV-1) encodes two putative protein kinases, US3 and UL13. The physiologic role of either enzyme is not known. We have compared the growth of wild type virus and US3 deletion virus in several cell lines at twelve hour intervals for ten days clear via kidneys, our research evaluated the total SOD, Cu/Zn-SOD, and Mn-SOD defense system of kidneys from male (n=15) and female (n=15) Sprague-Dawley 9 month old rats. All rats were housed individually and fed a liquid diet ad libitum. After anesthetization with pentobarbital, half of male and half of female rats underwent bilateral flank skin incisions and bilateral laser suture via digital manipulation. All kidneys were collected Day 5 post-trauma and analyzed for total SOD, Cu/Zn-SOD, and Mn-SOD by pyrogallol oxidation with KCN quenching. Protein content was determined by the Lowry method. When data were compared on the basis of units of activity/mg protein, the results were nonsignificant, no significant gender differences were observed between the wild type virus and US3 deletion mutant virus.

**Board O**

**COMPARISON OF KIDNEY SUPEROXIDE DISMUTASE (SOD) LEVELS IN MALE AND FEMALE TRAUMATIZED RATS.** EUGENE ORLOWSKI, HENRY OKONTA, QING YANG, AUGUSTA ASKAR, RONALD H. BRINKMAN, MEDICAL COLLEGE OF OHIO, TOLEDO OH 43699-0008.

Since males respond more strongly to trauma than females, and since catechol metabolites clear via kidneys, our research evaluated the total SOD, Cu/Zn-SOD, and Mn-SOD defense system of kidneys from male (n=15) and female (n=15) Sprague-Dawley 9 month old rats. All rats were housed individually and fed a liquid diet ad libitum. After anesthetization with pentobarbital, half of male and half of female rats underwent bilateral flank skin incisions and bilateral laser suture via digital manipulation. All kidneys were collected Day 5 post-trauma and analyzed for total SOD, Cu/Zn-SOD, and Mn-SOD by pyrogallol oxidation with KCN quenching. Protein content was determined by the Lowry method. When data were compared on the basis of units of activity/mg protein, the results were nonsignificant, no significant gender differences were observed between the wild type virus and US3 deletion mutant virus.

**Board P**

**URINARY TAMM-HORSFALL PROTEIN IN DIABETIC WOMEN.** ANGELA A. BELLOW, JOANA CHINHABRATORY AND JOHNATHAN S. ROSS, DEPT. OF PHYSIOLOGY AND BIOBIOGRAPHY, MEDICAL COLLEGE OF OHIO, PO BOX 10098, TOLEDO OH 43699-0008.

Tamm-Horsfall protein (THP), a glycoprotein, is normally excreted in large amounts in urine. THP may be used as a specific marker for renal damage at the ascending limb of the loop of Henle and distal convoluted tubule. The objective of this research project was to determine the THP excretion in normal and diabetic post-menopausal women. Twenty-four hour urine samples were collected from 6 diabetic and 8 control patients. The average age of the diabetic and control group was between 60-70 years. Gel electrophoresis, western blotting and enzyme-linked immunosorbent assay (ELISA) were performed with each sample. In gel electrophoresis, the low concentrations of urine samples did not produce a visible THP band. The increased sensitivity of the western blot conclusively showed that the 6 samples from diabetic patients had substantially reduced amounts of THP in comparison to the 8 control and the standard samples. Quantitative analysis of the ELISA showed decreased THP in diabetic samples compared to the controls. Based on these results, it was concluded that urinary THP concentrations were substantially reduced in post-menopausal diabetics compared to controls. This work was supported by a grant from the Douglass Foundation, St. Vincent Medical Center.

**Board Q**

**COMPLIANCE AND ULTRASTRUCTURAL CHANGES OF LASER-ASSISTED VASCULAR ANASTOMOTIC SITES.** Y. IIMIZUNA-M, SAKUMA, K., TAKEHANA, R., YAMADA, K., YAMASHITA, T., KOTANI, M., ABE, T., AND YAMAZAKI, ASIT. EBIHARA, HOKKAI, OHIO UNIVERSITY (MED.), OHIO STATE UNIV. (VET), RAKUNO-GAKUEN UNIV. (VET), RAKUNO-GAKUEN, OHIO UNIVERSITY (MED.), OHIO STATE UNIVERSITY, TOLEDO OH 43699-JAPAN.

Correlation between compliance and ultra structural changes of laser-assisted vascular anastomosis (LAVA) in comparison with conventional suture vascular anastomosis (CSVA) was investigated. End-to-end anastomoses were performed on the common carotid arteries (3mm in external diameter) of 11 healthy mongrel dogs. In LAVA, transected artery was approximated with a laser of 700 microns diameter in a pulse of 0.1 seconds at an energy of 25 Watts. There were no significant differences in post-menopausal diabetics compared to controls. This work was supported by a grant from the Douglass Foundation, St. Vincent Medical Center.
However, the majority did report that there should be a level of shared responsibility between pharmacists and physicians for both types of information. It appears that pharmacists recognize the unique contributions that both pharmacists and physicians contribute to patient care and desire a synergistic partnership with physicians.

BOARD S  PERSONALITY ASSESSMENT AS POTENTIAL PREDICTORS OF STUDENTS PERFORMANCE IN AN ELECTIVE ON COMMUNICATION AND PSYCHOSOCIAL SUPPORT. SHERIYI BAYLIFF, RICHARD WHITE, MARCO B. TAMBUFO, MD, ELIZABETH DONOVAN, RN, BENNET G. HUMPHREY, MD, PH.D., DEPT. OF PEDIATRICS, MEDICAL COLLEGE OF OHIO, PO BOX 10008, TOLEDO OH 43699-0008.

To determine if the California Psychological Inventory (CPI) will identify personality characteristics that help predict student performance in an experimental elective. Methods: Medical students (20) 1st & 2nd class participated in an elective to provide early patient-doctor relationships emphasizing listening. The focus was on open communication, psychosocial support, and finally experience with closure. Participants were required to complete the CPI. After orientation, the students spent two hours/week with a child or sibling from the oncology clinic. Students developed a ‘big brother/sister’ type relationship and provided appropriate social support. The CPI was used to attempt to identify any personality profiles that might correlate with outcome. Results: The CPI was easy to administer, analyze and was well accepted by the students. This 466 item personality inventory was designed to measure positive personality characteristics. Our student population fell into four groups (e.g. %17/20, 3/20, 3/10, 1/20). Twenty standard scales also indicated some difference in our students (e.g. Empathy: 2/20 were scored low; 7/20 average and 11/20 high). Conclusion: There were different CPI findings among our students. The course will be completed at the end of March. This test has been used successfully at other medical schools in other student related education research projects. Evaluation of student performance will be correlated with CPI scales in January 1994.

BOARD T  AWARENESS OF SEXUALLY TRANSMITTED DISEASES BY STUDENTS IN LARGE NIGERIAN PUBLIC SCHOOLS. ADEPO M. OKONWOKA*, AUGUSTA ASAKA*, WALTER EDEMEKONKAI**, MEDICAL COLLEGE OF OHIO, TOLEDO OH 43699-0008; *MEDICAL STUDENT, **SURGERY, ***PSYCHIATRY DEPT.

Since young people are often confronted with tough decisions about sex, and since worldwide travel increases the likelihood of spreading sexually transmitted diseases, an open-ended questionnaire was administered to secondary school students ages 12 to 17 in large public schools in Nigeria. Questions were designed to elicit awareness and beliefs about which diseases could be transmitted through unprotected sex. When asked to identify the sexually transmitted diseases on a list of diseases (genital herpes, cholera, gonorrhea, syphilis, AIDS, hepatitis B, malaria, sickle cell, syphilis, and yellow fever), 44% recognized HIV, 19% identified gonorrhea, 3.5% identified genital herpes, 1.5% identified hepatitis B as diseases that can be transmitted through sex. Our research highlights the urgent importance of educating teenagers worldwide about infectious sexually transmitted diseases and of enabling them to resist peer pressure, protect their own health and that of others. (Partially funded by MCO Foundation

PODIUM PRESENTATIONS

Biological Sciences Division

AQUATIC BIOLOGY
9:00 AM - Saturday, April 23, 1994

Henry Robert T. Heath, Presiding

9:00 SUBSTRATE PREFERENCE OF GASTROPODS IN THE LAKE LITTORAL DURING SEASONAL SUCCESSION. PAOLO C. LOMBARDQ, G. DENIS COOKE, DEPT. OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44242.

Freshwater gastropods are generally omnivorous, their food resources being fresh and decaying plant materials. The hypothesis that gastropods shift from predominant herbivory to detritivory during seasonal succession, following macrophyte blooming and subsequent decline was tested in situ. The gastropod assemblage occurring in the shallow littoral zone of East Taw Lake, Northeastern Ohio, was offered macrophytes organized as separate leaf packs of Ceratophyllum demersum and Potamogeton illinoiensis, equally divided into fresh and decaying plant tissue items. The gastropod distribution on the leaf packs was surveyed from June through November 1993. Leaf packs were placed in the lake water, left for 7 days, and replaced with new ones after another 7 days. Changes in abundance of species over the 14 day period were analyzed with community and abundance indices, including the Percent Model

The purpose of this study was to evaluate the importance of C-flux from prototaxons to macrozooplankton (MACZ) along a nearshore-to-offshore axis in Lake Erie in 1993. MACZ grazing on prototaxons was observed in duplicate 8L carboys filled with filtered (200 μm) lake water to which MACZ were added at 0X, 1X, 2X or 4X ambient densities. Significant inverse relationships between MACZ biomass and prototaxon C-flux were observed (over 10008; 60%; p<0.05). MACZ clearance rates on prototaxon groups ranged from 0.25 - 2.03 μg dry wt d-1 in nearshore and from 2.12 - 150.54 μg dry wt d-1 in offshore. In both environments, small nanoflagellates (NANF) were preferentially grazed by MACZ. Average C-flux from NAP to MACZ in nearshore was about four times higher than in offshore. High C-flux from prototaxon to MACZ in both regions compared with algal C-flux to MACZ at the same season suggested that prototaxons were a potentially important trophic link between bacteria and macrozooplankton in Lake Erie. This study was supported by Ohio Sea Grant.

9:30 THE IMPORTANCE OF PINCERS IN CRAYFISH FEEDING: A POSSIBLE FUNCTION OF CYCLICAL SEXUAL DIMORPHISM. TROY A. KELLER, UNIV. OF MICHIGAN, DEPT. OF BIOLOGY, ANN ARBOR MI 48109-1048.

Male crayfish of the family Cambarellidae have two distinct morphologies called cyclical sexual dimorphism. The male reproductives have large pincers relative to their total body weight while the female reproductives have small pincers. Since worldwide travel increases the likelihood of spreading sexually transmitted diseases, an open-ended questionnaire was administered to secondary school students ages 12 to 17 in large public schools in Nigeria. Questions were designed to elicit awareness and beliefs about which diseases could be transmitted through unprotected sex. When asked to identify the sexually transmitted diseases on a list of diseases (genital herpes, cholera, gonorrhea, syphilis, AIDS, hepatitis B, malaria, sickle cell, syphilis, and yellow fever), 44% recognized HIV, 19% identified gonorrhea, 3.5% identified genital herpes, 1.5% identified hepatitis B as diseases that can be transmitted through sex. Our research highlights the urgent importance of educating teenagers worldwide about infectious sexually transmitted diseases and of enabling them to resist peer pressure, protect their own health and that of others. (Partially funded by MCO Foundation

9:45 PHOSPHATE UPTAKE PARAMETERS AND PHOSPHORUS DEFICIENCY INDICES IN SANDUSKY BAY AND LAKE ERIE. ROCHELLE STURTEVANT AND R.T. HEATH, DEPT. BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44242.

Stontal and temporal patterns of phosphate uptake were examined for the mixed surface layer along an axis extending from the upper basin of Sandusky Bay to the central basin of Lake Erie during summer 1993. Parameters affecting velocity of phosphate uptake were measured using a Riger bioassay: bioavailable phosphate (BAP), transport constant (K), and maximal uptake velocity (Vx). Riger estimates of BAP indicate that concentrations are low (frequenent less than 5000). The K ranged from 3 to 3000. The Vx in Sandusky Bay was consistently greater than that observed at central basin sites in Lake Erie by at least an order of magnitude. Using track-etched hydrophobic filters to size-fractionate the community, we found that bacterial uptake generally amounted for 50 to 70 percent of phosphate uptake. Phosphorus deficiency indices (calculated as the ratio of optimum photosynthesis, P to V x of phosphate uptake) were consistently low indicating a high degree of phosphorus limitation throughout the transect. This study was supported by Ohio Sea Grant and cooperative Institute of Limnology and Ecosystem Research.

10:00 EFFECTS OF ZOOPLANKTON GRAZING ON ALGAE IN NEARSHORE AND OFFSHORE LAKE ERIE. MATT BROWN, S-J HWANG, AND R.T. HEATH, DEPT. BIOL. SCI., KENT STATE UNIV., KENT OH 44242-0001.

The purpose of this study was to examine the grazing effect of zooplankton (>200 μm) on algae at a eutrophic site in Sandusky Bay (SB) and an oligotrophic site in Lake Erie (LE). Zooplankton manipulation experiments were performed in duplicate in 9 L carboys. Carboys were filled with filtered (200 μm) lake water. Zooplankton (MACRO) were collected by vertical tow and added to the carboys at approximate concentrations of 0X, 1X, 2X, 4X ambient zooplankton density. Initial samples were taken immediately after zooplankton additions. Carboys were stained in the dark and final samples were collected after 24 hours incubation. Copepods (Cyclopoidea, Cladocera) and all other bottom-dwelling organisms dominated the zooplankton of SB. Filamentous blue-green algae dominated SB noticeably less, mainly consisting of <95% total algal biomass. SB zooplankton showed no significant grazing effect on algae. In LE site, small uncollated diatoms and greeners dominated the algal community while the most abundant zooplankton were Bosmina and Calanoids. A grazing effect was observed in LE site. This study was supported by Ohio Sea Grant.
10:15 SEASONAL VARIATIONS IN THE PREDATION RATE OF CYCLOPID COPÉPODS IN SANDUSKY BAY, OHIO AT THREE DIFFERENT LEVELS OF FOOD DENSITY. BRUCE S. LIBMAN AND R.T. HEATH, DEPT. BIOL. SCI., KENT STATE UNIV., KENT OH 44224-0001.

Surface water from Sandusky Bay was filtered through a 200-µm mesh screen to remove microzooplankton and placed in ten 250 ml opaque plastic bottles. To five of the bottles 7 cyclopoid predators were added. The other five bottles served as controls. The predators were allowed to feed on the remaining microzooplankton (rotifers < 200 µm) for 24 hours. The same procedure was replicated but using water that was manipulated to yield either a ten-fold increase or a ten-fold decrease in microzooplankton (rotifers <200 µg). Small rotifers such as Keratella coeholicus and Anuraeopsis fissa were readily consumed by the predators, respectively, 11 and 3 per predator per day during June at ambient density. At higher and lower densities of prey, the predation rates were lower than the rate at ambient density. However, the pattern of preference did not change between densities. These patterns were consistent throughout the summer months.

10:30 ARE HETEROTROPHY AND PHOTOTHEROTROPHY IMPORTANT PROCESSES FOR OBTAINING REDUCED CARBON COMPOUNDS BY GONYOSTOMUM SEMEN IN AN ACID BOG LAKE? PING JIANG AND ROBERT T. HEATH, DEPT. BIOL. SCI. AND WATER RESOURCES RES. INST., KENT STATE U., KENT OH 44224.

This study was done in Triangle Lake, an acid bog lake, to estimate the relative importance of photosynthesis, heterotrophy and photophototrophy (vs. depth) to the carbon metabolism of Gonyostomum semen (Rhaphidophyceae). Uptake of "C-HCO3-, H+glucose and H+leucine by G. semen was conducted in a photosynthetic, an ichnolite that can hold glass scintillation vials, illuminated at light intensities of photosynthetically active radiation (PAR) ranging from zero to 400 µE m-² s-¹. The resulting photosynthetic rate vs. irradiance parameters (P-I curve) were used, along with measurements of light penetration in the lake, to estimate the photosynthetic rate profile along with depth. Our results showed that photosynthesis of G. semen was not photophototrophic. Heterotrophy by G. semen was the most significant form of obtaining reduced carbon compounds at depths greater than 2 m. This study was supported in part by Ohio Sea Grant.

10:45 FRESHWATER SPECIES OF THE DINOFLAGELLATE CERATIUM. SUSAN CARTY, HEIDELBERG COLLEGE, DEPT. OF BIOLOGY, 310 E. MARKET STREET, Tiffin OH 44883 USA.

Freshwater species of Ceratium are reviewed. Species with the apical horn at an angle to the cingulum, C. commutatum and C. carolinianum, are considered valid and closely related to each other. Species with the apical horn perpendicular to the cingulum, C. brachyceroides and C. furcoides, can be distinguished by their various shapes and dimensions (e.g., length, width, number of horns) as well as the presence or absence of short, secondary horns. Ceratium is currently thought to be the best example of the realm of the phytoplankton, including the presence of polarized light, a process that is used to determine the exact location of the cell.

Plant Sciences Meeting
1:00 PM - Saturday, April 23, 1994
Van Wert
Dr. John Furlow, Presiding

A special meeting for all Academy members who are interested in the plant sciences will be held. A discussion will be held on how plant scientists may be accommodated within the new organizational structure of the Academy. For more information contact Dr. John Furlow at the Ohio State University Herbarium at (614) 292-3216.

BOTANY - PLANT SCIENCE
01:30 PM - Saturday, April 23, 1994
Van Wert
Brian C. McCarthy, Presiding


Periphytic diatoms were identified from several locations along the Cuyahoga River, a tributary of south central Lake Erie, during June 1992 following extensive renovations in wastewater management strategies. Prior to these renovations, a similar study had been conducted in 1974. Based on 1992 data with those of 1974 showed a shift in dominant species and number of taxa present. The specific taxa are Cylindrotheca closteroides at Old Portage, secondly to C. meneghiniana, at Old Portage (middle reaches) from H. amphibia, and at Independence (downstream) from Navicula minucrassata. A slight increase in the number of taxa was observed at Old Portage and Independence with a marked increase in number of taxa at Hiram Rapids.

1:45 50 YEARS OF "WEED" STUDIES IN OHIO (1882-1932). RONALD L. STUCKEY, MUSEUM OF BIOLOGICAL DIVERSITY, OHIO STATE UNIVERSITY, 1315 KINNEAR RD., COLUMBUS OH 43212.

During the hay-day of floristic weed studies in Ohio (1882-1932), 35 authors published 92 papers. The majority of these were prepared by botanists at the Ohio Agricultural Experiment Station, which had not until after the Station's establishment in 1892, did organized knowledge become available on the state's flora. W.R. Lazerty, OSU professor of horticulture and botany and also the Station's first director, wrote six papers, including a list of 229 species (1886) and the relationship of naturalized plants to soil and climate (1888). W.S. Devol (1883-1886), Lazerty's student and first appointed botanist, wrote six reports which included a list of farm weeds, descriptions of troublesome species, and information on characteristics of weedy plants (1888-1884). While employed as the second station botanist, Frederica Dethers (1881-1882) did not conduct research on weeds, but later during her career in Ohio, she published eight papers, three of which are on plant diseases. Mary (1890, 1897) and Canada thistle (1895, 1927). A.D. Salesy (1884-1923), the third botanist, returned weed research to the Station. Among his contributions were the spread of Russian thistle (1914) and noxious weeds along thoroughfares (1915). His most important and useful contributions were the first Ohio Weed Manual (1906), followed by a second edition (1909) and a third and final edition (1926). A noteworthy non-Station contribution was made by Harriet Mason (1895-1896) on individual species in the Ohio Farmer, the Kelkerman's (1930) paper on the non-indigenous flora of Ohio, L.D. Starr (1900) with a list of railroad weeds, and Grace M. Kellar (1931) on weeds in the Miami Valley.

2:00 TALISPI ALLIACEUM L. (BRASSICACEAE) IN THE UPPER OHIO DRAINAGE. ALLISON W. CUSICK, DIVISION OF NATURAL AREAS & PRESERVES, ODNR, FOUNTAIN SQUARE, COLUMBUS OH 43224.

The occurrence of Thalipia alliaceum L. in the North American flora has been generally overlooked. This species is absent from most regional manuals. Prior to 1982, this European species had not been recorded in Ohio. Thalipia alliaceum has spread widely in the upper Ohio River drainage in the past decade. It is currently documented from 19 counties in five states: Indiana, Kentucky, Ohio, Virginia, and West Virginia. The species grows on moist roadsides and in low-lying, fallow fields along or near the Ohio River and its major tributaries. Thalipia alliaceum is commonly known as garlic mustard, because of its pungent, garlic-like odor and ability to form dense stands. The plant is an annual, and often a dominant species in disturbed areas, such as roadways, railways, and underbrush. Its presence is a sign of human activity and a indicator of habitat degradation.
vegetation of the northern Peten region of Guatemala have been undertaken. This region is currently the center of many conservation efforts because of the vastness of intact forest cover, great biological diversity, and increasing human use pressure. The purpose of our study was to quantify the composition and structure of upland forest vegetation in a defined area of the north-central Peten. Five 2km transects were established in Tikal National Park and North of Uaxactun. A 25x50m quadrat was randomly placed every 300m along each transect and samples of all 50 or 55 individuals collected on each quadrat. Subjects were classified based on a characterization of the morphology (stems, shrubs & saplings) and understory (seedlings and herbs). Over 90 species of canopy trees were inventoried, however, most were relatively rare. Four or five canopy species accounted for 40-50% of the relative importance in each sample area. The greatest shared dominance at all sites Brohmia alacrima, Cedrella odorata and L. lucida. The latter primarily for house construction.

Composition and structure of the upland tropical moist forest of the Peten, GUATEMALA. PATRICK A. WITTMACK AND BRIAN C. MCCARTHY, DEPT. OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS 45701.

The Maya Biosphere Reserve, 1.5 million ha of tropical forest in northern Peten, Guatemala, supports sustainable extractive industries. However, only two tree species have been evaluated for their economic impact. This investigation, which used artifact and inventory interview data collection methods, quantified the use of over 90 tree species in the villages of Uaxactun (within reserve) and Caoba (outside reserve). Levels of use were measured by the number of responses given for each species and the number of uses attributed to each. Many species were identified as useful for more than one of the seven use categories. Approximately 50% of the 90 species identified were over 30 cm in diameter when identified as medicines. In Caoba, Swertia macrophylla, Manilkara spp. and Ceratophyllum odorata, were identified most often and had the highest number of uses. Uaxactun residents relied most heavily on Cedrela, Manilkara, and Cassia bynuma vellutina, the latter primarily for house construction. The highest levels of use are for species whose use is associated with previous harvesting; however, this reflects past species created when these commercially exploited woods were readily available. Currently, villages not constrained by harvesting and transportation restrictions are expanding their use of economically valuable species. Residents of Caoba consider 40% of all useful tree species to be marketed compared to only 10% in Uaxactun.

A field study of peony species in western China. Tao Sang, DEPT. OF PLANT BIOLOGY, OHIO STATE UNIVERSITY, COLUMBUS 43210.

Peonies, with great ornamental and medicinal value, have been known as “king of flowers” and “queen of herbs” for more than one thousand years. There are approximately 30 species belonging to the genus Paeonia (Paeoniaceae) in the northern Hemisphere, with distributional centers in the Mediterranean region and China. This field study investigated ecology and biology of wild populations of nine peony species endemic to western China. Studies of subsection Delavayanae in Yunnan and Xizang (Tibet) provinces revealed that P. delavayi has larger numbers and sizes of populations than P. lutea, and they do not occur sympatrically. Another species of this subsection, P. patens, was not found in Lijiang, Yunnan Province, where it is endemic, indicating that it is very rare or possibly extinct. On Tai Shan Mountain in Shanxi Province, P. mariae and P. veitchii were found sympatrically, but the former flowers earlier than the latter. Paeonia anomala is distributed in northern Europe, the Americas, and Siberia. It is described in 1976 based on differences in root morphology with P. anomala. These two species were compared in the field at the first time, and they were discovered to be areally sympatric but ecologically partitioned. They can also be distinguished by minor differences in leaf morphology. Although the two species flower at the same time, no morphologically intermediate individual was found. All facts suggest these two taxa should be treated as good biological species.


Previous studies have indicated that halophytes are capable of adjusting internal osmotic potential in response to changing soil moisture and salinity conditions. In order to compare the relative drought tolerance of Alnus prostrata, Hordeum jubatum, Salicornia europaea, Sparrangi a marina and Suaeda corkcaseformis, seedlings were grown in growth chambers under 3 water treatments (n = 14). Soil moisture conditions were monitored on a daily basis using WESCOT soil psychrometers. After 45 days, plant height and the ash free dry weight were determined for each plant. ANOVA procedures indicated that both the height and the ash free dry weight were significantly reduced under drought stress conditions for all species except S. corkcaseformis (p < 0.05). Friedman's test of the relative means indicated a significant difference among species in height (p < 0.02) and ash free dry weight (p < 0.05) under the various water treatment conditions. Soil moisture was the most severely affected by drought since it obtained 76% of its relative height and 36% of its relative weight in the low water treatment group. Growth of S. europaea was more greatly inhibited than any of the other species under the low water treatment; height growth decreased by 42% and ash free dry mass decreased by 57% relative to that of the high water treatment.
or herbivory. Thus, it is important to understand how a plant utilizes nutrients as it grows. In the spring of 1992, a study was initiated to determine how leaf tissue nitrogen dynamics are affected by time of sampling, tree size/age, or position of sampling within the canopy. Preliminary data collected from 18 yellow-poplar ranging from 0.5 to 40 cm diameter indicated trees of all sizes exhibited similar patterns of N dynamics throughout the season. Nitrogen concentrations were highest in June and averaged 6.7 ± 0.46 g N/g. Concentrations dropped approximately 21% in July to 2.6 ± 0.41 mg N/g and remained fairly constant through September. Just prior to leaf senescence in early October, concentrations averaged only 1.3 ± 0.34 mg N/g, indicating these plants translocated or lost (due to herbivory or leaching) approximately 60% of the nitrogen prior to leaf abscission. Some variations in nutrient concentrations due to sampling position within the canopy were present, but differences were not significant at most sampling times. These findings will be compared to the responses of yellow-poplar at other sites.

CELL BIOLOGY - BIOCHEMISTRY
09:00 AM - Saturday, April 23, 1994
Williams
Thomas C. Jegla, Presiding

9:00 BLOCKING THE FUNCTION OF E-CADHERIN TOGETHER WITH P-CADHERIN INHIBITS CALCIUM-INDUCED REORGANIZATION OF JUNCTIONAL COMPONENTS IN CULTURED HUMAN KERATINOCYTES. Jane E. Lewis and Margaret J. Wheelock, Dept. of Biology, University of Toledo, Toledo OH 43606.

Human keratinocytes grown in 30 μM calcium display minimal cell-cell interactions. However, elevation of calcium to 2mM induces the formation of adherens junctions and desmosomes. Within 3-6 days after elevation of calcium to 1mM, the cells stratify to form a multilayered structure that resembles skin in vivo. Human keratinocytes express two members of the cadherin family of adhesion molecules, E-cadherin and P-cadherin. E-cadherin is expressed throughout the stratified culture while P-cadherin is restricted to the basal layer. We have previously shown that fusion blocking antibodies to E-cadherin delay the formation of adhesive structures and disrupt the formation of a stratified culture. Antibodies to E-cadherin, however, do not prevent stratification. In the present study we show that antibodies to P-cadherin alone have minimal effect on the ability of the cells to form junctional complexes but antibodies to both cadherins, when added together, prevent formation of normal junctions and inhibit keratinocyte stratification. Supported by NIH CA44464 & AR39674.

9:15 EFFECT OF SUBSTRATE CONCENTRATION ON BIODIGESTATION OF ORGANIC COMPOUNDS. Majid Zarifiifar and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115. Jack Kuei-Chung Shih and Yu-Li Yeh, Ming Hsin Engineering College, Hsinchi, Taiwan.

The microbial growth and utilization of organic chemicals is influenced by substrate concentration. There may be a threshold concentration below which microbial growth cannot occur. In stream water, for example, less than 10% of 2,4-D was mineralized in eight days at initial concentrations of 2.2 μl and 22 μl, but at the higher concentrations of 622 μl, 80% was mineralized in the same time period. It has also been shown that at the low 18 g/l concentration of glucose, the biodegradation rate was below the rate predicted by Monod kinetics. The effects of low concentrations of chemicals in natural waters on health issues is aged in this presentation. The criteria and standards of water quality limit maximum acceptable level of most organic pollutants to the 0.10 μg/l, while the ppb level of many organic compounds have been reported harmful. A chemical may not be toxic at low concentration in natural waters, however, if it bioaccumulates in living cells it may reach the toxic concentration.

9:30 INVESTIGATION OF Y-ORGAN REGULATION AND HEMOLYMPH ECDYSTEROIDS IN THE CRAYFISH ORCONCETES IMMUNIS. Keviin K. Mathur and Dr. Thomas C. Jegla, Kenton College, Gambier OH 43022.

Moltting in crayfish is hormonally controlled by ecdysteroid production in the Y-organ. Ecdysteroid synthesis in the Y-organ is negatively regulated by Molt Inhibiting Hormone (MIH). While the exact nature of this regulation is not fully understood, cyclic nucleotides and calcium are known to be involved, and Protein Kinase C seems to be involved in the crab Cancer antennarius (Mattson and Spaziani, 1967). Our study was undertaken in order to determine what role, if any, PKC plays in the regulation of crayfish Y-organ steroidsogenesis. Y-organs were incubated in various concentrations of either PKC activators or inhibitors. Phorbol 12-Myristate, 13 Acetate (PMA) strongly depresses ecdysteroid synthesis in activated Y-organs in the nanomolar and micromolar ranges. In replicative experiments the ED50 was somewhat less than 10-6 M. H-7, a selective inhibitor of PKC, did not alter synthesis at physiological levels. Based on our results, PKC seems to play a role in the negative regulation of ecdysteroid synthesis in crayfish Y-organs.

10:00 KINETICS OF BIODEGRADATION OF ORGANIC COMPOUNDS. Majid Zarifiifar and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115. Ruth Yu-Li Yeh and Jack Kuei-Chung Shih, Ming Hsin Engineering College, Hsinchi, Taiwan.

The Monod equation shows the relationship between the limiting substrate concentration and growth rate. This equation has modelled both pure and mixed cultures, and laboratory bench scale reactors to full size industrial units. However, there are indications that this equation is not valid in case of high concentration of substrate with inhibitory effects and in case of low substrate. In addition, end product may inhibit the enzymatic reactions to limit the use of the Monod equation. The excess substrate in batch reaction results in the increase in the lag time, while in the continuous reactor, it will result in process instability. A model is developed for mutual substrate inhibition below glucose. It is shown that, when both 2,4-D and glucose are available, mutual substrate inhibition is observed. In this presentation, the biodegradation of pentachlorophenol is studied using the Haldane modification of Monod equation to explain the inhibitory effects of substrate at low concentrations.


We report findings on surface area and volume of sickled red blood cells based on their morphologies. Using data preparations of sickled red blood cells, we measured cell parameters for three types of cells: convex-convex, parabolic, and S-shaped. These parameters were then used to calculate cell surface area and volume for 318 cells and to compute their surface-to-volume ratios. Both adult and pediatric cells were measured. The surface area and volume data were found to be somewhat larger than reported measurements performed by micropipette aspiration techniques. Excellent correlation was found in distinguishing the three cell types. Our data suggests that the surface area and volume of sickled red blood cells may be approximated by mathematical techniques.

ENVIRONMENTAL BIOLOGY
1:30 PM - Saturday, April 23, 1994
Henry
John F. Wing, Presiding

1:30 CYTOLOGICAL DAMAGE IN NEEDLES OF WHITE PINE (PINUS STROBUS) EXHIBITING SYMPTOMS OF OZONE INJURY (TIPBURN). Carolyn J. McCauley and George A. Scheur, USDA Forest Service, 359 Main Rd., Delaware OH 43015.

Some white pine genotypes are particularly sensitive to ozone, exhibiting needle symptoms that range from a yellowish mottle to necrotic tips (tipburn). In July of 1992 at the Delaware Forest Service lab, a white pine tree growing in pots containing tipburn of many of its current-year needles has been observed near an injured tree of the same age and size. To compare cellular differences in the needles from the two trees, injured and uninjured needles from the damaged tree and needles from the healthy tree were prepared by conventional methods for transmission electron microscopy. All needles examined showed large starch grains, few mesophyll cells, including swollen chloroplasts and accumulations of dense compounds, was greater in injured and uninjured needles from the damaged tree than in needles from the healthy tree. The plethora from the injured tree also had a greater amount of phytoene cell blockage (vesiculation) or cellular collapse. Previous studies of ozone injury have reported mesophyll distortion similar to cellular changes seen in this study, but ozone has not been reported to cause phytoene cell collapse. Therefore, it is not known if the tipburn was caused by ozone alone or if phytoene collapse and visual injury resulted from some unknown stress.


In 1991 and 1992, 35 sugar bushes in ten counties were examined to evaluate the health status of sugar and red maples (Acer saccharum Marsh. and Acer rubrum L.). In 1991, injury incidence and severity (cankers, decay, insect injury, or open wounds) on roots and boles, and
number of open tap holes were recorded on each of 700 trees (20/stand). On a sub-sample of 175 trees, foliage, soil, and increment cores were sampled to evaluate nutrient status, age, and radial growth rates. In 1991 and 1992, all 700 tree crowns were evaluated to estimate percent crown dieback and crown transparency. On roots, large wounds (>5 cm) incidence and severity were evaluated. In bucket-collection sugarbushes susceptible to those with tubing collection systems. In addition, the incidence of both small and large open wounds was positively correlated with the number of years a sugarbush has been tapped. In 1991 and 1992, over 95% of all 700 trees had >15% crown dieback. Tapped red maples, compromising only 10% of the 700 trees, were measured, had higher crown transparency and crown dieback than sugar maples. Foliar nutrients were variable across the 35 stands, but generally within the range reported for "healthy" maples. Foliar A/L concentrations, reported to range from 31 to 60 ppm, averaged >100 ppm in four stands. Tree ages ranged from about 50 to over 275 years and mean basal area increased age-dependent. While most sugarbushes were healthy, crowns in over mature stands were deteriorating.


Crabtree Woods, believed to be one of the oldest Allegheny hardwood stands in western Maryland, was studied to determine stand history, composition, and structure. A 1.0 ha permanent plot was established at mid-slope and all stems >2.5 cm DBH were identified, measured, and mapped. Increment cores were taken from all Quercus rubra stems >10 cm DBH to determine stand age and to aid in reconstructing stand history. The overstory (stems >10 cm DBH) contained a total of 11 species from 7 families. Oak and Acer species accounted for over 85% of the relative importance (RI = 39.1, 24.9, and 21.3, respectively). Castanea dentata was clearly important in this stand at one time as evidenced by large standing dead and downed trees. The understory consists (>10 cm DBH) contained 16 species of which A. saccharum being the overwhelming dominant (RI = 72.5). The overall stand density was 1296 stems/ha, with 21.4% being stems >10 cm DBH. Stand basal area was determined to be 36 m²/ha, with 94% coming from overstory trees. The diameter distribution revealed a reverse-J pattern typical of an old, unmanaged stand. While several trees were found to be in excess of 100 cm DBH, site quality is high and the older trees exceed 150 years of age. Shannon-Wiener diversity index (H') was estimated to be 1.74 for the overstory and 0.777 for the understorey. Burn scars on tree trunks indicate that fire is part of the disturbance regime of this stand, however, absence of charcoal from increment cores suggests a history of only very light surface burns.

2:15 ESTABLISHMENT, SURVIVAL, AND GROWTH OF STRIPED MAPLE SEEDLINGS. JENNIE L. EVERHART AND PATRICIA A. PERONI, SLAYTER BOX 618, DENSON UNIVERSITY, GRANVILLE OH 43022.

This study identifies variables important for the emergence, survival and growth of striped maple (Acer pensylvanicum) seedlings. Striped maple is of particular interest due to its reproductive strategy as a sequential hermaphrodite, its sex-biased population ratios, poor dispersal ability, patchy distribution, and its status as a major competitor of economically important species such as red pine. Influences of environmental variables on emergence of seedlings were studied in a permanent hectare plot containing 231 one m² subplots. Proximity to nearest maternal tree, photosynthetic active radiation, and soil depth were measured. Two types of subplots (with seedlings, without seedlings) differing significantly in height and distance from nearest possible maternal tree. These results suggest that the largest determinant for establishment is dispersal. Similar measurements were taken to examine environmental influences on survival and growth. ANOVA at five m² plots containing recently emerged seedlings showed that plots differed significantly in seedling height, leaf area, soil depth, and distance to the nearest neighbor distance. An ANCOVA with subplot as a factor for soil depth and leaf area, there was a significant positive relationship between soil depth and leaf area. Mean values for initial height were greater for surviving seedlings, indicating that size is a good predictor of survival in emergent striped maple seedlings. Growth data revealed that distance to the nearest conspecific seedling had a small but significant effect on total leaf area and relative growth in leaf area. Dispersal distance, initial size, soil depth, and intraspecific competition are important factors in seedling performance in striped maple.


Lonicera maackii (Amur Honeysuckle), native to Manchuria and Korea, was originally introduced to North America ca. 1895 and was first reported as an escape from cultivation in 1961 in Hamilton County, Ohio. Analysis of herbivory specimens shows that non-cultivated shrubs of L. maackii occur in Ontario and 21 states of the eastern US. In southwestern Ohio, L. maackii can be found growing at densities of up to 6800 shrubs/ha in secondary forests. Because there is a reduced herb layer under dense stands of this shrub, L. maackii can be considered to be an "invader" in the sense that it replaces native vegetation. L. maackii is a deciduous shrub that grows to 6–10 m in height with large, opposite, palmate compound leaves, greenish-white flowers, and numerous blue fruits that continue to ripen from early September until frost provide sufficient reproductive potential that prompt action will be required if an effort is to be made to control this invasion of Polygonum perfoliatum (L.) in Pennsylvania, Maryland and West Virginia has been well documented. A population is now established in an industrial area in the Ohio River valley in Washington Co., Ohio. Polygonum perfoliatum is an annual that has been known to invade fields, forest edges, and impoundments over the ground, building and trees, and buildings or adjacent vegetation which is usually killed because of the heavy shading. Recurved prickles along the petioles and weak stem enable it to reach several meters into trees. The numerous blue fruits that continue to ripen from early September until frost provide sufficient reproductive potential that prompt action will be required if an effort is to be made to control this invasion of Polygonum perfoliatum in Ohio.

3:00 POLLINATION ECOLOGY OF MONTANE/SUBLAPLAIN BUMBLEBEES AGAIN. LAZARUS W. MACGILL, DEPT. OF BIOLOGY, THE UNIVERSITY OF ABERDEEN, ABERDEEN, AB 44235-3908.

Data from a 1993 study of the pollination dynamics of six bumblebees (Bombus L.) species on seven plant species, of which they are the primary pollinators, in Berkeley Hil, Mt. Rainier, and contrasted with results of previous investigations. Relative frequencies of bumblebee species in the study area remained unchanged with B. melanopygus being most commonest overall and on each plant species except Penstemon rupicola and Castilleja pumila. Factors affecting bumblebee abundance were: 1) plant species, 2) plant reproductive strategy, 3) the degree of pollinator specialization, 4) the occurrence of sterile seedlings, 5) the degree of pollinator specialization, 6) the occurrence of sterile seedlings, 7) the degree of pollinator specialization, 8) the occurrence of sterile seedlings, 9) the degree of pollinator specialization, 10) the occurrence of sterile seedlings, 11) the degree of pollinator specialization, 12) the occurrence of sterile seedlings, 13) the degree of pollinator specialization, 14) the occurrence of sterile seedlings, 15) the degree of pollinator specialization, 16) the occurrence of sterile seedlings, 17) the degree of pollinator specialization, 18) the occurrence of sterile seedlings, 19) the degree of pollinator specialization, 20) the occurrence of sterile seedlings, 21) the degree of pollinator specialization, 22) the occurrence of sterile seedlings, 23) the degree of pollinator specialization, 24) the occurrence of sterile seedlings, 25) the degree of pollinator specialization, 26) the occurrence of sterile seedlings, 27) the degree of pollinator specialization, 28) the occurrence of sterile seedlings, 29) the degree of pollinator specialization, 30) the occurrence of sterile seedlings, 31) the degree of pollinator specialization, 32) the occurrence of sterile seedlings, 33) the degree of pollinator specialization, 34) the occurrence of sterile seedlings, 35) the degree of pollinator specialization, and 36) the occurrence of sterile seedlings. The latter-blooming Penstemon rupicola, P. pumila, and Lupinus canadensis were mostly worker-pollinated, while the later-blooming Castilleja pumila, P. groenlandica, and Lupinus canadensis were mostly worker-pollinated.

3:15 FORAGING RESPONSES BY APHAENOGASTER RUDIS TO VARIABLE FOOD REWARDS ON SEEDS OF SANGUINARIA CANADENSIS. STEPHEN T. LUI AND E. RAYMOND HEITHAUS, BIOLOGY DEPT., KENYON COLLEGE, GAMBER OH 43022.

In myrmecochory, ants incidentally disperse seeds of many understory plants by responding to cues that are not related to larval food. Because ants generally deposit seeds into the soil or trash piles, it is possible that seeds could be dis tributed to larval food sources. Although continued seed collection would be expected in this mutualistic system, the ant Aphaenogaster rudis is quickly satiated by seeds (carrying behavior decreases drastically after a few dozen seeds are taken). Hypotheses to explain the cessation of seed removal include: nest capacity is exceeded, sufficient nutrition is available, or elaisosomes include chemical inhibitors. These hypotheses were tested in seed removal experiments using Sanguinaria canadensis seeds manipulated to provide different ratios of edible elaisosome to inedible seed. Food/seed ratios were altered by reducing or enhancing elaisosomes on seeds by half: controls were unmanipulated seeds and seeds with elaisosomes removed and then reglued. Ants were caged by treatments in multicolony and single-ant treatments. The null hypothesis was not supported because ants did not harvest a consistent total seed volume. The sufficient nutrition hypothesis was not supported because ants did not compensate for elaisosome reduction by collecting more seeds. The chemical inhibition hypothesis was supported only if ants collect seeds for a limited amount of time following first exposure.

3:30 THE EFFECTS OF SANGUINARIA CANADENSIS ELAISOMES ON POPULATION DYNAMICS OF APHAENOGASTER RUDIS. MANUEL A. MORALES AND E. RAYMOND HEITHAUS, BIOLOGY DEPT., KENYON COLLEGE, GAMBER OH 43022.

Myrmecochory is a mutualism providing dispersal to plants and food to ant larvae. Demographic benefits to plants are documented, but the hypothesis that ant populations are enhanced by collecting this particular food source is untested. The discovery that ants satiate quickly when collecting myrmecochorous seeds raises the question of whether this "mutualism" is purely reciprocal. In order to determine the effects of elaisosomes on the fitness of Aphaenogaster rudis colonies, we provided thirty ant colonies with Sanguinaria canadensis seeds, while another thirty colonies were provided with seeds lacking elaisomes. The null capacity hypothesis was not supported because ants did not harvest a consistent total seed volume. The sufficient nutrition hypothesis was not supported because ants did not compensate for elaisosome reduction by collecting more seeds. The chemical inhibition hypothesis was supported only if ants collect seeds for a limited amount of time following first exposure.
3:45 LOW OFFSPRING SURVIVAL FOR OLD FEMALE WHITE-FOOTED MICE (PEROMYSCUS LEUCOPUS), JOSPEH J. JACOBY AND STEPHEN H. VESSEY, DEPT. OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

As part of a long-term demographic study of white-footed mice in northwest Ohio, we wished to determine the relative contribution of young and old females to the next generation. Prior work has demonstrated that long-lived female Peromyscus leukopus produce litters at the same rate as short-lived females. Litter production rate is a crude fitness measure; therefore, we used offspring survival as a better measure of female fitness. We marked 75 mice in antilac nests at boxes at an early age to follow their survivorship. The litter number (parity) of the mother was estimated by examination of previous capture records. Parity and maternal age were highly correlated, so parity was used as an index of maternal age. We classified litters by maternal experience as early, the first or second reproductive attempt, or late, all subsequent attempts. Offspring survival is known to be influenced by season of birth, and P. leukopus experiences a mid-summer decline in breeding; therefore, litters were classified as spring- or fall-born for analysis. Old females had significantly lower survival than young females. A significant interaction was found between parity and season. Offspring survival was significantly higher for litters produced in the spring by females of low parity. Spring-late, fall-early, and fall-late litters were statistically indistinguishable in offspring survival. These findings suggest that old, multiparous females invest less in offspring than young females.

4:00 DIFFERENTIAL CHANGES IN RAPTOR COUNTS AT HAWK MOUNTAIN, PA DURING THE DDT ERA. JOHN F. WING. WITTMENBERG UNIVERSITY, PO BOX 7207, SPRINGFIELD OH 45501.

Wing (1994) has reported the total raptor count at Hawk Mountain shows cycle disruption during the early period of the DDT era. Here similar effects are reported for raptor subfamilies and tribes (but not Accipiters) in the Hawk Mountain area. Raptor numbers have, however, stabilized in the last several years and the data set is now long enough to allow a simple visual evidence of cycling before World War II but the records are too short to test. In the DDT era (1946-1972), the accipiters (mostly sharp-shinned and cooper's hawks) show significant (p<0.01) decline and cycle disruption up until 1964, and in the recovery and Post-DDT era their numbers increase again and cycling returns (but cycling does not reach significance). Buteos (mostly red-tailed and broad-winged hawks) level off rather than decline in the DDT era and show significant (p<0.01) 3-yr cycles compared to significant 8-12 yr cycles (p<0.05) in the recovery and Post-DDT era. The harriers counts rise steadily from 1934-1990 and cycling exists at least up until 1980. (Although raw data is not significant, residuals of counts do show a 10 year cycle at p<0.05). Falcons (mostly kestrels) show both increase and 10-yr cycles (p<0.05) from 1945-1990, but cycle amplitudes are smaller during the DDT era. These findings are in agreement with Wing's analysis and show that cycles can be disrupted by other factors than human activities and that recovery and stabilization of populations can take place without extermination of the population.

4:15 DISRUPTION OF 10-YEAR CYCLE IN TOTAL RAPTOR COUNTS AT HAWK MOUNTAIN, PA DURING THE ERA OF DDT USAGE. JOHN F. WING, WITTERING GREEN UNIVERSITY, PO BOX 7207, SPRINGFIELD OH 45501.

Bednarz et al (1990) analyzed Hawk Mountain raptor counts for effects of DDT on population trends. A priori they set up three eras: Pre-DDT (1934-1942), DDT (1946-1972) and post-DDT (1973-1986). During the DDT era they found significant declines in two accipiters with long life cycles and cycling returns (but cycling does not reach significance). Buteos (mostly red-tailed and broad-winged hawks) level off rather than decline in the DDT era and show significant (p<0.01) 3-yr cycles compared to significant 8-12 yr cycles (p<0.05) in the recovery and Post-DDT era. The harriers counts rise steadily from 1934-1990 and cycling exists at least up until 1980. (Although raw data is not significant, residuals of counts do show a 10 year cycle at p<0.05). Falcons (mostly kestrels) show both increase and 10-yr cycles (p<0.05) from 1945-1990, but cycle amplitudes are smaller during the DDT era. These findings are in agreement with Wing's analysis and show that cycles can be disrupted by other factors than human activities and that recovery and stabilization of populations can take place without extermination of the population.
virus. Several test crosses were set up and complementation and recombination events were documented using visual PIB counts and plaque assay. The results of these crosses have enabled these mutants to be classified in several distinct complementation groups. The recombinant viruses have aided in the mapping of several viral genes. In addition, these crossed viruses have been used to further increase the effectiveness of the LdNPV virus as a biological control in lieu of chemical insecticides. 

We have previously shown that intra-specific differences in thyroid hormone levels exist in rats (Ferriman et al. 1993). Also, major differences in endocrine parameters occur among different species (Ewing et al. 1979; Huhtaniemi et al. 1982; Amador et al. 1990). These included differences in circulating thyroxine levels. The present study was undertaken to analyze the differences that might exist in thyroid hormone metabolism, among various species of vertebrates. Thyroid hormones from adult male and female Norway rats, Syrian hamsters, House mice, Guinea pigs, and Canada geese were obtained. Thyroid and liver fragments were homogenized. Tissue thyroxine (T4) and triiodothyronine (T3) levels were then measured using iodine-radioimmunoassays. Geese had the highest thyroxine T4 levels, and in mice they were undetectable. Female rats had higher thyroxine T4 than males, but otherwise no sexual dimorphism was detected in other species. Thyroid T3 levels were highest in rats and undetectable in mice. Male hamsters had higher thyroxine T3 than females and the opposite was true for Syrian hamsters. The thyroxine T3/T4 ratios were higher in liver than in other tissues. The present results indicate that there are inter-specific and inter-genus differences in thyroxine hormone levels. This gives further support to the importance of genetic regulation of thyroid hormones metabolism. These studies were supported by the SIU/OB/GYN Research Fund.

10:15 THE GENETIC FUNCTION OF INTRONS AS A MEANS OF REDUCING COPYING ERRORS. GERALD R. BENNING, P.A.D., NORTHWEST STATE COLLEGE, 22-600 STATE Rd. 34, ARCHDLE OH 43502.

Two main divisions of DNA strands are introns and exons. The introns are large stretches of DNA with biological functions that have only recently been explored. Long called junk DNA because their function was unknown, the introns are removed by splicing enzymes before mRNA, tRNA and rRNA can complete their function. All genes start with exons, but have a variable number of introns within them. Introns are common in eukaryotes, and found in prokaryotes only in exceptional cases. Theories of intron function include they are relics of genes that have now become useless or redundant, orexist as a means to allow genetic diversification. A new theory by Shepherd proposes that they serve a function for the purpose of error correction. The fact that a huge amount of energy is put into a complex mechanism to form the intron system argues that they have some important biological function. Shepherd's theory is that they serve a function similar to the error checking system built into nearly every electronic and digital transmission system. After the exons are checked, the redundant bits are then discarded. Research along this line was reviewed; concluding that the error checking system is a viable hypothesis that needs to be evaluated further.

10:30 HERPES SIMPLEX VIRUS: EXPRESSION OF VIRUS ENCODED DUTPASE, K. BECKER AND M.Y. WILLIAMS, MOLECULAR, CELLULAR AND DEVELOPMENTAL BIOLOGY PROGRAM AND DEPT. OF MEDICAL MICROBIOLOGY AND IMMUNOLOGY, OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

Studies on the herpes simplex virus (HSV) encoded deoxyuridine triphosphate nucleotidohydrolase (dUTPase) have been hampered because this enzyme is essential for HSV to grow in cell culture. The objective of this research was to determine the effects of dUTPase on HSV infection and to compare the biological activities of dUTPase with and without the recombinant plasmid pGEX-3X. Transformation of the recombinant plasmid pGEX-3X into Escherichia coli (JM109) and subsequent induction of the glutathione S-transferase gene resulted in the expression of a fusion protein with a molecular weight of 70,000. Enzymatic analyses demonstrated that this fusion protein exhibited dUTPase activity. The results of these experiments contradict the early hypothesis that HSV infection and cell death in the infected cell occurs due to dUTPase activity. The presence of dUTPase activity in the infected cell may be a contributing factor to HSV infection and cell death. The results of this study are consistent with the hypothesis that HSV infection and cell death in the infected cell occurs due to dUTPase activity.

10:45 PARAMUTATION, AN EPGENIC CHANGE ASSOCIATED WITH THE SHIFT FROM VEGETATIVE TO REPRODUCTIVE PHASES IN THE DEVELOPMENT OF THE MAIZE PLANT. BERNARD CO. MAUKA, DEPARTMENT OF BIOTECHNOLOGY, DEPARTMENT OF BIOLOGY, DAVIE OH 43512.

An assumption of Mendelian genetics is that both alleles in heterozygotes remain unchanged when tested in subsequent generations. Paramutation at the R locus in maize provides an exception to this assumption. When the R gene, a transpositional activator responsible for kernel pigment, is made heterozygous with its allele R, all R genes undergo a change in expression. The change in R-gene expression is heritable in following generations. It has been assumed that this change in R-gene expression takes place progressively throughout somatic development and appears as a tassel mosaic upon sampling of male genotypes at maturity. Evidence will be presented to show that paramutation is controlled by light and temperature conditions within a four-day period at the time seedlings are shifted from the vegetative to the reproductive phase of development.

MOLeClAR BiOLOGY 01:30 PM - Saturday, April 23, 1994

WILLIAMS Paul A. Fuerst, Presiding

1:30 SEQUENCE COMPARISONS OF THE HYPERTENSIVE AND NORMOTENSIVE Y CHROMOSOMES OF THE RAT. ELIZABETH GRAHAM, AMY MELSTED AND MONTe TUrNER, DEPT. OF BIOLOGY, UNIVERSITY OF AukRON, AukRON OH 44325-3908.

The Y Chromosome of the Spontaneously Hypertensive Rat (SHR) has a gene that increases blood pressure. There are currently no molecular markers for the y chromosome. Genetic divergence of nuclear genes between the SHR and the Wistar-Kyoto rat (WKY) are not consistent with divergence measured by comparing mitochondrial DNA. The comparison of Y chromosomes between these two strains needs to be evaluated further. The Y chromosome of the SHR and WKY is different. Some primers, from the human Y chromosome map, amplify bands which appear in the SHR or WKY male DNA, but not in the female DNA. These bands are assumed to be of the Y chromosome origin. We have isolated these male specific bands of the human Y chromosome markers from SHR and WKY. These were sequenced using the dideoxy chain terminating procedure and TAO polymerase. Sequences from SHR and WKY were compared to the sequence of the mouse Y chromosome, to insure the same locus was being amplified. Sequences from the SHR chromosome were obtained by obtaining bands from the SHR chromosome. These experiments were then compared between the SHR and WKY strains to obtain a index of Y chromosome divergence between these two strains.

1:45 THE DIRECT EFFECTS OF ANGIOTENSIN II ON PROTO-ONCOCENES, C-JUN, C-FOS AND ZINC FINGER PROTEIN EGR-1 IN PERFUSED, ISOLATED MURINE HEARTS. MIKE SIM, DANIEL ELY, AMY MELSTED AND MONTe TUrNER, DEPT. OF BIOLOGY, UNIVERSITY OF AukRON, AukRON OH 44325-3908.

Recent research in the field of cardiovascular molecular biology has provided evidence via cell culture for a role of the peptide angiotensin II (Ang II) in myocyte hypertrophy. Ang II acts through the G protein signaling cascade triggering a nuclear response resulting in synthesis of appropriate proteins for myocyte hypertrophy. Expressions of nuclear-acting proto-oncogenes (p-onc) appears to be the earliest indicator of ensuring hypertrophy. In this study, we used the p-onc, c-jun, c-fos and zinc finger protein egr-1 as probes to determine gene levels in rNA of rat hearts. Twenty hearts of 15 week old Wistar-Kyoto normotensive rats were used. Ten hearts were perfused with 10M M concentration of Ang II via the Langerdorff isolated heart procedure; control groups received perfusat alone. p-onc expression was quantified by measuring amounts of proto-oncogene mRNA using dot blots. The dot blots were hybridized with 32P-labeled nick translated cDNA probes for respective p-onc. Quantitative analysis of the dot blot hybridizations was carried out by imaging and detection on the BioScope analyzer. Preliminary investigations show 15% to 25% increase in p-onc levels as compared to the controls. Although still an ongoing investigation, evidence suggests Ang II as a direct growth factor for cardiac hypertrophy.

2:00 COMPARISON OF HYPERTENSIVE AND NORMOTENSIVE Y CHROMOSOME. ASIF QADRI, MONTY MONTGOMERY, DANN ELY AND MONTe TUrNER, DEPT. OF BIOLOGY, UNIVERSITY OF AukRON, AukRON OH 44325-3908.

The objective of this research was to identify and compare Y chromosome DNA markers from hypertensive (SHR) and normotensive (WKY) rat Y chromosomes. PCR primers specific for the human Y chromosome were used to amplify rat DNA. Annealing stigencies were reduced and the presence of male specific bands was taken as evidence of Y chromosome amplification and the presence of a rat Y chromosome marker. Amplification patterns for these primers were compared in SHR and WKY males. A total of 12 human Y chromosome primers were tested. Only four of the primers failed to amplify male specific bands in the rat DNA. Of the eight rat Y chromosome markers only two were amplified in the same in SHR and WKY males. These primers identified male specific bands in either SHR or WKY and these bands were not found in the other strain. These primers amplified male specific bands in either SHR or WKY and the same size bands were found in the other strain but not male specific. Using the human Y specific primers is a way to identify Y chromosome markers in other species. The hypertensive and normotensive Y chromosomes have a number of mutations that separate them. The existence of male specific bands in one strain not male specific in the other strain could indicate the existence of a translational or inversion on the hypertensive Y chromosome.
2:15 EFFECT OF DIFFERENT PROTOCOLS ON THE REPRODUCIBILITY OF RAPD PRIMERS. MIN ZHANG, DEBBIE STEEL, DANIEL ELY and MONTE TURNER, DEPT. OF BIOLOGY, UNIVERSITY OF AKRON, AKRON OH 44325-3908.

Many labs using RAPD primers have questioned the reproducibility of amplification patterns using this technique. The objective of this study was to vary the concentrations of various components of the reaction mixture and compare amplification patterns. Amplifications were done using different protocols. Each reaction was run in triplicate. To compare the efficiency of the new protocols, new banding patterns were compared individually to the old protocols. When the results were compared, the average number of new bands varied but new bands did not appear. Primer concentrations from 0.5 micromolar to 1.5 micromolar did not affect results. Changing the TAQ buffer concentrations from IX-0.3X also does not affect results. TAQ concentrations from 0.1 to 1.5 units per reaction does not affect the results. We have tried to vary parameters within a range expected to be small experimental errors in the procedure had occurred, rather than concentrations that were experimentally unattainable and within this range the RAPD amplifications were reproducible as far as the sizes of the bands amplified.

3:20 MILK AS A FACTOR IN THE DEVELOPMENT OF HYPERTENSION IN THE SPONTANEOUSLY HYPERTENSIVE RAT. MONTY MONTGOMERY, DAN ELY and MONTE TURNER, DEPT. OF BIOLOGY, UNIVERSITY OF AKRON, AKRON OH 44325-3908.

Many important factors have been found which are passed to the infant in the mother’s milk. For example antibodies in the milk interfere with the immune system of the infant. These factors are known to have great influence on the health and well-being of the developing infant. Cross-fostering experiments involving Spontaneously Hypertensive Rats (SHR) and normotensive Wystar-Kyodo (WKY) have shown strongly that milk factors from WKY mothers can partially ameliorate hypertension in the SHR rat. The purpose of this study is to determine which factors may be involved in the development of hypertension and pass on to their offspring in the mothers milk. The first step that had to be accomplished, before any preliminary analysis of the milk could occur, was to determine the best possible way to obtain milk samples from nursing dams. This was accomplished through the design of a milking device which was a modification of a device discovered in a literature search. Several milking procedures were tried with anesthesia to prevent stress related factors in both the mother and researcher. The best samples were obtained with breast anesthesia and oxytocin as a muscle relaxant to improve flow. Milk once isolated can be used to compare the milk of SHR and WKY for factors which are present in one strain, but not the other strain.

2:45 CHARACTERIZATION OF STAPHYLOCOCCUS EPIDERMIDIS STRAIN FLO192. DAWN M. BROWN and L. GLATZER, DEPT. OF BIOLOGY, UNIVERSITY OF TOLEDO, TOLEDO OH 43606.

The properties of Staphylococcus epidermidis strain FLO192 are under examination. This strain was isolated from a post-cardiac surgery wound of a patient treated heavily with the quinolone Ciprofloxacin. FLO192 possesses four plasmids with sizes of approximately 27 kb, 4.4 kb, 2.6 kb, and 2.3 kb. pTO117, the largest plasmid, is self transmissible and provides resistance to Ampicillin, Staphylococcus epidermidis and other wildlife. To study polymorphism, carp and human genomic DNA were isolated and digested with restriction enzymes and blasted to a nylon filter. The resulting bands vary but new bands do not appear. This is lost when pTO117 is transferred to S. aureus RN450/4.

3:15 DNA SEQUENCES OF THE gpd and gld genes, and two possible transport genes, members of a glycerol metabolizing operon in Coxiella burnetii? BONH VEN and PAUL A. FUERST, DEPT. OF MOLECULAR GENETICS, OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

Coxiella burnetii, a Gram-negative obligate intracellular bacteria, is the etiological agent of Q fever. The metabolic capabilities of C. burnetii appear to have several unusual features. Glutamate, rather than glucose, is the main energy source available to the cell. In studying genes related to membrane transport, we identified a 3.7 kilobase DNA fragment which contained four open reading frames. The four open reading frames had been found to have homology in other bacteria. Two of the ORFs are homologous to members of the glp-operon of E. coli, the glycerol kinase (gkp) and glycerol-3-phosphate dehydrogenase (gld) genes. The C. burnetii sequences were compared with homologous sequences from E. coli and B. subtilis. The nucleotide similarity of C. burnetii gkp with E. coli gkp was 0.55, while comparisons with B. subtilis gld showed nucleotide similarity of 0.57. Equivalent comparisons of amino acid sequences were 0.51 and 0.53. When E. coli and B. subtilis are compared, nucleotide and amino acid similarity are 0.62 and 0.54. For gkp, the C. burnetii sequence had nucleotide similarity of 0.52 with E. coli and 0.45 with B. subtilis, while amino acid similarity was 0.64 and 0.37, respectively. Similarity for the E. coli B. subtilis comparison was 0.41 (nucleotide) and 0.53 (amino acid). The remaining two ORFs were identified as transport proteins. These sequences were found to have highly significant sequence similarity to the noo and nof transport proteins of Rhodobacter. The conservation of structure and orientation of the genes suggests that they are part of a conserved ATP-binding active transport system.


Lysine is synthesized via the α-aminoacidopropion, an unique pathway present in fungi. This pathway consists of eight enzyme steps and seven newly identified genes in S. cerevisiae. This pathway is not present in bacteria, plants or in humans. The presence of the α-amino acid pathway has been demonstrated in several pathogenic fungi. The LYS1 gene of Candida albicans encodes sarcosporine dehydrogenase, the last enzymatic step of the α-amino acid pathway. LYS1 gene sequence homology to yeast was found in several enzymes. In order to function properly in yeast, a complementation assay with yeast and other non-pathogenic fungi. The presence of conserved DNA sequences within the genes of the α-amino acid pathway may be useful as target sequences for the detection of these organisms in vivo.

3:45 MOLECULAR EVOLUTION OF aRNA GENES IN TICK BORNE AND INSECT BORNE Rickettsia, an obligate intracellular bacteria. DANA R. STOTHARD and PAUL A. FUERST, DEPT. OF MOLECULAR GENETICS, OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

Members of the eubacterial genus Rickettsia belong to the c-subgroup of the phylum Proteobacteria. They are small, generally rod-shaped, gram-negative bacteria and are obligate intracellular bacteria. Several species of Rickettsia cause disease in man, including Rocky Mountain Spotted Fever (RMSF) and epidemic typhus. Other non-pathogenic forms exist which are not known to infect man and/or cause disease. Rickettsiae have historically been classified as vectors or the insect. Data on the complete gene sequence has been collected for both the 16s and 23s rRNA genes of the SFG species and F. tularensis, and the spotted fever group (SFG), found in licks. However, the most common species endemic to North America, R. bellii, does not fit neatly into any of these categories. This research focuses on molecular approaches to the phylogeny of the genus Rickettsia. Specifically, there are three aims to this project: 1) to determine the phylogenetic relationship between pathogenic and non-pathogenic species of Rickettsia, 2) to determine the phylogenetic relationships of R. bellii to SFG and TSG species, and 3) to determine which orthorelated vector is exploited first, the tick or the insect. Data on the complete gene sequence has been collected for both the 16s and 23s rRNA genes of the SFG species R. rickettsii, R. conorii, and R. sibirica, R. parkeri, R. australis and R. tsutsugamushi, and the TSG species R. prowazekii. Both R. prowazekii and R. bellii have been sequenced. The data indicate that R. bellii diverged just prior to, or at the time of the split of the genus into the TSG and SFG. Overall genetic differentiation in Rickettsia is small, with no species showing more than 1.7% and 3% divergence from other members of the genus for the 16s and 23s rRNA genes.
In an epidemic of equine influenza which occurred in India in the year 1987, Aeq-1 and Aeq-2 viruses were isolated. The Aeq-1 isolate (Aeq/Ludhiana/87) was found to be antigenically similar to Aeq/Prague/156. The involvement of Aeq-1 virus, in addition to Aeq-2, was unusual. In haemagglutination inhibition (HI) tests with a panel of monoclonal antibodies, Aeq-2 isolates (Aeq/37 and Aeq/87) were found to react from Aeq/Prague/156 strain. In affected animals, the antibody response in sera collected at different times was determined. The results showed significant decreases in antibody titre for first serum (early convalescent phase/late acute phase) and the serum at 4-5 months after the onset of illness against Aeq-2 virus. However, with Aeq-1 virus, the antibody response was stronger and persisted at similar levels except in one case where significant decline was noted. The concurrent isolation of both types of equine influenza virus together with the serological pattern in affected animals indicated that during the epidemic of equine influenza, both types of equine influenza virus were active in the same equine population, in North India. It appeared to be the first instance of confirmed existence of both types of equine influenza virus in the same epidemic.

4:10 ISOLATION OF MANCUSA DEXTA DNA FRAGMENTS WITH HOMOLOGY TO THE DROSOPHILA GENE BICOID. Richard M. Clark and Dr. David J. Marcey, Kenyon College, Gambier OH 43022.

In Drosophila (a Diptera), very early development is directed by maternal genes whose transcripts or products are subcellularly localized within the oocyte. Whether similar maternal genes specify positional information in insect taxa other than Diptera is unclear. We have attempted to isolate a gene with homology to the Drosophila gene bicaudal (bod) from the Lepidopteran Manduca sexta. In Drosophila, a bicaudal fragment from Manduca cDNA and two fragments from Manduca genomic DNA which hybridize to bod cDNA. Sequence data for the PCR products with homology to the bod gene will be presented, as will a description of the temporal distribution of the corresponding gene during early Manduca embryo growth.

ZOLOGY-ANIMAL SCIENCE
1:30 PM - Saturday, April 23, 1994
Seneca
Paul M. Daniel, Presiding

1:30 INTRASPECIFIC NEST PARASITISM IN WOOD DUCK POPULATIONS NESTING IN BOXES. Courtney N. Willis, David W. Waller, and Lowell P. Orr, Dept. of Biological Sciences, Kent State University, Kent OH 44242.

Intraspecific nest parasitism, where a female lays eggs in the nest of a conspecific, occurs frequently in populations of Wood Ducks (Aix sponsa) nesting in boxes. To determine the 1) percentage occurrence of parasitism, and 2) influence of parasitism on clutch size, number of hatchlings, and percentage hatch, nest boxes were monitored at Berlin Wildlife Refuge (50 nests) and Mosquito Creek Wildlife Refuge (57 nests) in northeastern Ohio during Spring of 1993. For the "successful" nests (those with at least one hatchling), parasitism occurred in 6/10 nests at Berlin and 12/17 nests at Mosquito Creek. Clutch size increased significantly in parasitized vs. normal nests at Berlin, 10.5 ± 1.1 vs. 12.8 ± 1.3 eggs; Mosquito Creek, 23.6 ± 5.4 vs. 10.7 ± 1.2 eggs (ave±SD). Number of hatchlings increased in parasitized vs. normal nests (Oberlin, 14.6 ± 4.0 vs. 9.5 ± 3.1 chicks; Mosquito Creek, 14.7 ± 5.5 vs. B.0 ± 3.0 chicks). Percentage hatch decreased in parasitized (68%) vs. normal nests (74%) at Mosquito Creek, but remained the same (80%) for both at Berlin.

1:45 DAILY ACTIVITY PATTERNS AND MIST NET CAPTURES OF FALL MIGRANT LAND BIRDS. Jennifer K. Hathaway, Macomber Bird Observatory, Wittenberg University, P.O. Box 6100, Springfield OH 45501-5100.

Activity patterns of birds vary throughout the day. Birds during migration can be classified as either nocturnal or diurnal migrants. Using mist net capture data from Macomber Bird Observatory (1980-1992) and field observations, I compared the patterns of captures, observations, and behaviors of birds throughout the daylight hours. Capture patterns for nocturnal and diurnal fall migrants correlate with previous studies of spring migration, and summer and winter activity level studies. Highly significant differences were found to exist among observed behaviors over the course of the day at both the species level, and nocturnal and diurnal categories. Mist net capture and observation detectability patterns tend to vary from each other only slightly over the course of the day.

2:00 BULLFROG (RANA CATESBEIANA) LOCATION AND BEHAVIOR DURING HIBERNATION. Nicholas Zarlinga, Scott Orrock, and Jerry Stinner, Dept. of Biology, University of Akron, Akron OH 44325-3908.

It is generally well known that many ranid anurans overwinter submerged in water. However, little has been published on their behavior or location during winter. Some authors suggest that frogs remain inactive (torpid) in or on the bottom sediment which, if true, could explain their usually localized occurrence, particularly in shallow ponds. The purpose of the study was to determine if hibernating aquatic frogs are torpid. Six adult bullfrogs at two ponds (~0.25 ha each) in Summit County OH, were followed through a hibernation period in 1991/1992 by means of radio transmitters. During November and December, the frogs left their release sites and moved from 30 to 90 m to overwintering areas. Five of the frogs overwintered in relatively shallow areas near small inlet streams in the NW corner of the ponds. The remaining frog covered 1.2 m off the west shore. Collectively, the six frogs were located 208 times and were nearly always submerged. Frogs moved about even during the coldest periods. They were seen sitting at the water's surface or sitting on the bank on only 10 occasions. Bullfrogs that were observed submerged on the pond bottom were not buried or covered by silt. This study suggests that adult bullfrogs prefer relatively warm, shallow water for hibernacula and that they are not torpid. Future studies of thermal and dissolved O2 gradients are needed to determine their importance to overwintering behavior in bullfrogs.

2:00 POSSIBLE LUNAR CYCLES IN NESTING LOGGERHEAD SEA TURTLES ON KEY ISLAND, NAPLES, FLORIDA. John M. Spargo and E. Bruce McLean. Dept. of Biology, John Carroll University, University Heights OH 44118.

Preliminary data from the 1993 nesting season indicate a possible relationship between lunar cycles and nesting patterns of the Loggerhead Sea Turtle (Caretta caretta). Sea turtle nesting activity in the northern hemisphere peaks during the nights of May 16 through July 27, 1993. In June and July, nights of the full moon and adjacent nights had no nesting activity except one incident when the moon was below the tree line at the time of beaching. These data and references indicating that sea turtles are deterred from nesting by artificial light suggest an adaptive negative response to light. Additional data are used to test this hypothesis.


This study involved six turtles equipped with Model L Mini-Mitter radio transmitters captured, released, and tracked over a three year period in a combined woodland and grassland habitat in a Hamilton County, Ohio park. Maps were prepared of the study area which took advantage of a little used section of the park containing a trail constructed with braille signs and a wire guide for the blind which was no longer used. This provided an ideal set of reference points to monitor and record turtle positions. From this information home ranges were constructed and hibernation sites noted. Some turtles remained close to the site of original capture for the entire study period; others ranged away from the original study area and were lost, and others had large home ranges within the study area. A thermocouple was attached to the transmitter on each turtle and sub cambial temperatures were recorded each time a turtle was located. Soil and air temperatures in close proximity to the turtle were also recorded.

2:45 GENETIC VARIATION AND DIVERGENCE BETWEEN POPULATIONS OF THE ENDANGERED FISH, FUNDULUS DIAPHANUS MENONA. Dustin B. Sears, Malcolm D. Schag and Paul A. Fuerst, Dept. of Molecular Genetics, Ohio State University, Columbus OH 43210.

Since 1920 the western barred killifish Fundulus diaphanus menona has decreased greatly in abundance in Ohio. Currently, Ohio considers it a state endangered species. This decline has resulted in the establishment of an experimental population on the north shore of the Great Lakes, the northern part of Ohio. Only the Miller's Bluff population of Sandusky County is known to survive. The Ohio Department of Natural Resources has developed a restoration plan for the species. As part of this preservation effort, two derived population have been established at the Columbus Zoo and ponds of the ODNR Xenia Fish Hatchery. Levels of molecular genetic variability within the remaining natural population and between the stock populations was examined by protein electrophoresis of twenty enzyme systems, representing 35 genetic loci. Heterozygosity is very low in all populations. The Miller's Bluff population is not variable for any locus studied. A comparison was made between the Miller's Bluff population and other natural gene populations from the species range around the Great Lakes, to determine the extent of divergence between the Ohio population and populations of F. diaphanus menona across its geographic range. Preliminary results detected allele variation in these populations, but still at low levels. This high genetic similarity between all populations. We are extending our study to incorporate nuclear gene markers, including RAPD markers and VNTR typing. The information will better indicate the extent to which populations across the species range can be used in restoration efforts of this endangered species. (Supported by a grant from ODNR-Div. Wildlife).
3:15 MOLECULAR EVIDENCE FOR DISCRETE BREEDING STOCKS OF WALLEYE (STIZOSTEDION VITRUM) IN THE MAUMEE AND SANDUSKY RIVERS. ROBERT MEEKER, JOSEPH FAHER, CAROL STEPHEN, R. C. WOODWORTH DEPT. OF BIOLOGY, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

We have obtained molecular evidence using mitochondrial DNA (mtDNA) restriction site variation supporting the existence of separate breeding stocks of walleye between the Maumee and Sandusky rivers. Three separate regions of the mtDNA (D-loop region, 12S rRNA, ND4L, and ND4 genes, and 3. The 12s and 16s rRNA genes) were amplified using the Polymerase Chain Reaction (PCR) technique. These amplifications were digested with nine different four-base cutting restriction enzymes and were resolved on 5% polyacrylamide gels. Regions 1 and 2 produced restriction fragment length polymorphisms (RFLPs) and revealed a total of five different haplotypes. Each river displays a particular frequency pattern of each of the five haplotypes. Most of the Maumee river wall eye (65%) are split between two main haplotypes, with the rest of the fish possessing either one of two rarer haplotypes. In the Sandusky, 62% of the fish have one of the main haplotypes while the rest in the Sandusky have the others. The rarest haplotype is only seen rarely in the Sandusky. The other two rare Maumee haplotypes are also seen in haplotypes in the Sandusky. Further, 10% of the Sandusky walleye have a rare haplotype that has not yet been observed in the Maumee. None of the most frequent haplotypes were found to be exclusive to either of the rivers. These results show a significant difference between Maumee and Sandusky mtDNA haplotype frequencies, suggesting that these two populations do exist as separate breeding stocks. We have also identified a unique haplotype. Each river displays a particular frequency pattern of each of the five haplotypes. The Maumee River upstream of Perrysburg and Maumee and hauled to the canal sites for the Sandusky Bay.


Before 1900 the lake sturgeon, Acipenser fulvescens was an uncommon species throughout the Great Lakes. In the late 19th and early 20th century, overfishing and construction of dams which blocked spawning grounds decimated the population. The lake sturgeon is now considered an Ohio endangered species. As part of a restoration effort, a stock of lake sturgeon has been established by the Ohio Dept. of Natural Resources using fish from Wisconsin. This is the first example of genetic information being used in the establishment of captive fish populations. The mtDNA has been used as the sole source of stock to be reintroduced to the natural populations in Lake Erie. Appropriate as a sole source of restocking for the restoration of Lake Erie’s sturgeon population.

3:45 QUALITATIVE ANALYSIS OF THE HARBOUR ARCHAEOLOGICAL SITE (AD 1100) AT SANDUSKY, OHIO. TED M. CAVENDER AND JONATHAN E. BOWEN, MUSEUM OF BIOLOGICAL DIVERSITY, OHIO STATE UNIVERSITY, COLUMBUS OH 43212.

An unusually large quantity of fish skeletal remains was recovered at the Harbour Site by Heidelberg University archaeologists under the direction of Michael Pratt. The material represents a shallow water, near shore, Sandusky Bay fish assemblage with at least 25 species tentatively identified. Many small and medium sized fishes were present along with some very large individuals. The great size variation and exceptional diversity found in the material indicates probable capture by trap or seine, a hypothesis that is supported by the recovery of many net sets at the site. Collection areas with relatively firm, unstruck bottom conditions were probably selected close to the village. The dominance of adult pumpkin seed sunfish suggests these fish were taken during the early summer spawning season when adults are easily captured in shallow water by seining. Some open water species were present but most share an affinity with the shallow, weedy-margin habitat of Sandusky Bay. Other vertebrates identified at the site such as muskrat, ducks, turtles, and frogs agree with the fishes in identifying the habitat sampled. Preliminary work at identification suggests the following fish species may have been present in the examined material: longnose gar, bowfin, grass pickerel, northern pike, muskellunge, cisco, golden shiner, chubsucker, spotted sucker, silver redhorse, river redhorse, golden redhorse, shiner, dace, topminnow, channel catfish, brown bullhead, yellow bullhead, black bullhead, white bass, rock Bass, pumpkinseed, bluegill, smallmouth bass, largemouth bass, white crappie, yellow perch, walleye and drum.

Earth and Space Sciences Division

EARTH AND SPACE SCIENCE - GEOLOGY 9:00 AM - SATURDAY, APRIL 23, 1994

Wood C. Scott Brockman, Presiding

9:00 ANCEIENT DNA FROM NON MINERALIZED FOSSILS AND ITS APPLICATIONS IN EARTH SCIENCES. HONG YANG AND EDWARD M. GOLDBERG, DEPT. OF BIOLOGICAL SCIENCES, WAVEY STATE UNIVERSITY, DETROIT MI 48202.

The polymerase chain reaction (PCR) allows us to generate large quantities of specific genes from DNA samples derived from small amounts of degraded, nonmineralized tissues preserved in the geological record. Successful extraction, amplification, and subsequent sequencing of ancient DNA are largely dependent upon the quality of ancient materials that survived from complete decay and/or mineralization. Fossil materials that are suitable for ancient DNA study range from plant tissues to animal bones found in various paleoenvironments. Study of DNA-bearing plant fossils in Tertiary lacustrine deposits in Clarkia of northern Idaho suggests that preservation of DNA and other biomolecules is largely taphonomic-dependent. Unique taphonomic processes (e.g. unseasonal shedding, wind transport, light diagenesis) in favorable environments (e.g. anoxia, fast burial, fine sediments) were associated with the DNA-bearing plant fossils. Ancient DNA sequences can be verified by comparing contemporary sequences that are related to the targeted ancient taxa. Ancient DNA study provides unique genetic information of past organisms, and holds potential applications in various aspects of earth sciences.


Since 1986, The College of Wooster has granted one course (four semester hours) of college credit to selected 12th grade honor students from Orrville High School and Wooster High School who have completed a Physical Geology class specially designed by these three college geology teachers at The College of Wooster. Each member of the college geology faculty presents at least one lecture to the high school classes each year, and the students attend the guest lectures sponsored by the college geology department. This program elevates the importance of the Earth Sciences at the high school level and encourages students to consider a major in geology or related fields. The collaboration between high school and college geology teachers has built a partnership of geologic education which has been of great benefit to both high schools and the college.

9:30 EARLY USES OF CERAMICS AND BUILDING STONES IN DOWNTOWN TOLEDO. MARK J. CAMP, UNIVERSITY OF TOLEDO, DEPT. OF GEOLOGY, TOLEDO OH 43606.

An early use of dimension stone in Toledo, OH was in the construction of locks on the Miami and Erie Canal in the late 1830s - early 1840s. Silurian bedrock was quarried from the channel of the Maumee River upstream of Perrysburg and Maumee and hauled to the canal sites for use. Upon completion, canal potash blocks from Silurian stromatolites were also quarried at Dayton and Piqua to the city for use in bridge and foundation construction. Cobblestones collected from glacial and fluviatile deposits became the pavement of many early streets. Those in the Vietus district of which only Cedar Street survives intact, were probably laid in the late 1850s. Nearby Olive Street exhibits the use of rough face red granite blocks. Turn of the
The Silverheels Intrusive Complex (SIC) lies within the Colorado mineral belt, about 16 km southwest of Cuyahoga National Park. The SIC is a Laramide-type porphyry system consisting of a swarm of silts 6.8 km in area centered on a composite quartz monzonite stock. Two igneous phases and a complex series of contact metamorphic reactions are exposed throughout a vertical section of 1000m, over an area of 25 km², centered on the stock. The igneous rocks intrude arkose sandstones, siltstones, and limestone of the Pennsylvanian-Penn Maroon Formation, and sulfides occur as disseminations and veins in propylitized rock within roughly one kilometer of the stock. Gold placers related to weathering and erosion of the sulfides have been mined sporadically in the region since 1850. Microprobe analyses of pyrite, chalcopyrite, and pyrrhotite within the contact aureole have identified Au, Zn, Sn, and W (Mo and Pb were not found). Gold is the most abundant trace metal, averaging 570 ppm for the sulfide phases (for the rock, the maximum is 7 ppm, from the eastern margin of the central stock). The presence of the composite stock, plus alteration that includes significant sericite as well as the propylitic assemblage (epidote, chlorite, and calcite), suggest that erosion at Mt. Silverheels may have exposed the upper part of a porphyry metal system.


Of the four major models for the origin of the earth-moon system (fission, co-formation, tidal-capture, giant impact), only the tidal-capture and giant-impact models are compatible with an initial rotation rate for earth of about 9-13 hours/day. In the giant-impact model, the rotation rate of earth is increased from an initial 10 h/day to 5 h/day by the giant-impact event. From Ross and Schubert's calculations (1989, J. Geophys. Res., 94, p. 9541, fig. 5a) the lunar body would always be in a circular orbit with eccentricity less than 10%. In this model the lunar orbital radius expands rapidly from an initial 3 R, by 0.4 by a billion years before present, the lunar orbital radius is 4 R, and the earth's rotation rate is 14 h/day, and in contrast, a tidal-capture model (Molnar, et al., 1982, Proc. Vol 3rd Int. Archan Symp., p. 223) features capture at about 3.5 by to a highly elliptical orbit (major axis = 180 R, eccentricity = 0.8) with angular momentum equivalent to a circular orbit of 30 R (earth rotation rate=10 h/day). The lunar orbit then undergoes a progressive circularization with energy dissipation via tidal action within both bodies. Throughout the orbital circulation era, an annual sequence of gradually diminishing perigee tidal "spikes" dominates the ocean tidal regime. A two body calculation suggests an ultimate scale of about 1.4 billion years for centrifugation to 25 R (earth rotation rate=14 h/day). In general, the giant-impact and tidal-capture scenarios contrast greatly in the era 3.9-2.5 bybp, but both models imply a relatively rapid circularization of the orbits, essentially complete within a few hundred million years.

10:15 HYDROGEOLOGY OF AND INITIAL WELLHEAD PROTECTION PLAN FOR DOYLESTOWN, OHIO. Donald J. Jost and John P. Szabo, University of Akron, Dept. of Geology, Akron OH 44325-4101.

Information about the geology and hydrogeology of northeastern Wayne County, Ohio can be designed in a wellhead protection plan for the Doylestown municipal water field. The wellfield is located to the west of town and is underlain by the Sharon Sandstone. Although this formation provides drinking water for some homes in this area, the major aquifer is the Armstrong Siltstone/Rittenhouse Sandstone of the Mississippian Cuyahoga Formation. A buried valley underlies present-day Chippewa Creek about 4 km to the south of Doylestown. The permeable sand and gravel may be a suitable future groundwater source for the village. Doylestown is located in the Consultant Central Region (DRASTIC) and consists of seven hydrogeologic settings: Glacial Till Over Bedded Sedimentary Rocks (7a) and Buried Valley (7d). The average transmissivity of the bedrock aquifers is about 3300 gpd. The measured hydraulic conductivities of the Pennsylvanian sandstones are moderate (10⁻¹⁰ cm/sec) and the conductivities of the Cuyahoga Formation are low to moderate (10⁻¹⁰ cm/sec). Using this data, a comprehensive wellhead protection program can be instituted. By using the calculated fixed radius method, various capture zones may be delineated. The DRASTIC mapping system is used to determine the magnitude of potential pollution sources.


Accurate assessment of hydrologic conditions on hydric soils is important for wetlands classifications. DRAINMOD, an agricultural water management computer model developed in North Carolina, contains a validated water balance/hydrology component that can be used to assess wetland hydrology. The project is evaluating the potential use and application of DRAINMOD in assessing hydrology on hydric soils in Ohio. Based on long-term climatic records (10-30 year periods of record of hourly precipitation and maximum temperature) and soil information from the USDA-SCS SOILS database, preliminary wetland hydrology assessments have been conducted at nine locations. The wetland hydrology criteria used in the analysis was: water table level at 30 cm or less for seven consecutive days during the growing season. The results indicate that the model has potential for evaluating long-term hydrologic conditions on hydric soils in Ohio, and the influence of certain types of agricultural drainage on water table levels. For selected major soil types and locations, probability distributions of the exceedance of wetland hydrology criteria were developed as a function of drainage intensity. Potential limitations noted are accessibility of a sufficient period of record of climatic data, the application of generalized soil information from the SOILS database used to represent small-scale field conditions, and misinterpretation of results if model is used as a black box.

10:45 UNUSUAL DEWATERING OF WETLAND, SUMMIT COUNTY, OHIO. James R. Bauder, 6106 Armintie Ave., Canton OH 44718.

The wetland that was typified by emergent, phytophoretic vegetation, has experienced dewatering secondary to a unique series of land use changes. Although none of the earlier land use changes noticeably affected this site; more than 50 years of land use changes have greatly altered this former wetland so that it now contains large areas of upland hydrology. Significant land use changes began with the construction of roads that acted to intercept surface water flows. Later, industrial water well fields were developed immediately adjacent to this site. The last group of land use modifications included the construction of a long dike between the Tuscarawas River and its former flood plain.

Earth and Space Sciences Division Business Meeting
1:30 PM - Saturday, April 23, 1994
Wood C. Scott Brockman, Presiding
Earth and Space Science - Geography
02:00 PM - Saturday, April 23, 1994
Wood Thomas W. Schmidlin, Presiding
population. Community volunteers and a group of high school senior volunteers carried out a district-wide demographic survey on Saturday, January 23, 1993. The next step involved the identification, measurement, and testing of a set of potentially influential independent variables that might affect school enrollment. While over 60 independent variables were analyzed, 19 proved significant with r-scores greater than 0.7 or less than -0.5. Of these, 12 apparently important independent variables, 12 are recommended for further use with seven not recommended because of high standard error. In terms of variable categories, employment type, local construction, and several key population and household categories appeared among the most significant.

3:20 MEASURING THE UTILITY OF POPULATION PROJECTIONS.

David A. Swanson, Arkansas Institute for Economic Advancement, University of Arkansas at Little Rock, 2801 S. University, Little Rock AR 72204-1099.

State Demographic Centers and other organizations regularly prepare population projections for sub-state areas. In most cases these projections are held results that are within acceptable levels of accuracy. However, they also require a great deal of intellectual and capital resources. This paper explores issues involving the utility of these projections, primarily by examining the ratio of cost to a PRE Measure, which determines the Proportionate Reduction in Error that occurs by using a projection instead of a naive or "no-cost" alternative: holding constant the most recent census result. Empirical results for 1990 county population projections done in the 1980s are reported for counties in Arkansas, Ohio, and Washington, states that experienced different patterns of population change from 1970 to 1990. The results suggest that projections generally have utility. However, more precise cost measures are needed to fully evaluate utility.

3:45 DID ALL THE CHINESE TELL THE TRUTH? TESTING AGE REPORTING IN THE 1990 CENSUS OF POPULATION OF CHINA.

Joseph G. Spiebaldi, Department of Geography, Bowling Green State University, Bowling Green OH 43403.

The author tests the accuracy of age reporting in the 1990 Census of Population of China. Although China is the Third World's largest country, accounting for more than a fifth of the planet's population, and is among the very poorest, its census suggests an unexpectedly high degree of accuracy. Using the birthplace index and analysis of the psychographic age statistics, the author shows that China ranks among the very best in the world. This is surprising given the notorious record of most Third World countries. Such accuracy in reporting indicates that the 1990 Chinese census truly reflects the nation's age composition. The question that arises for the population geographer, then, is why is there an unusual imbalance in sex ratios in the world's largest country. The two critical variables in any census, age and sex composition, show China to be suffering from a systematic absence of females, resulting in national sex ratios at or above 100 for all ages. The noticeable imbalance in the childhood ages leads the researcher to suspect that perhaps females are being terminated at birth or are not being reported. Recent accounts of infanticide may be true given the one-child policy of China and the need not to "waste" a pregnancy if the outcome is determined through ultrasound scanning to be a female fetus. The imbalance in sex ratios by age odds holds true regardless of the scale of the geographic unit surveyed.

3:00 REGIONALISM IN CHINA: A CONTINUING GEOGRAPHICAL ISSUE.

Stephen S. Chang, Department of Geography, Bowling Green State University, Bowling Green OH 43403.

In discussing China, one cannot overlook the role of regionalism. It was a factor historically and is again a rising issue at present. Throughout Chinese history, when the central government was weak, regionalism grew strong, and it subsided when central control was firm. In China at the present time, regionalism is increasingly evident. This has been brought about by the rapid economic modernization of the past fifteen years. The uneven growth between the coastal and interior provinces has accentuated the problems of economic disparity and rivalry between regions. Moreover, economic gains enable wealthier provinces to be more independent and to resist, disengage, or merely pay lip service to the policies of the Central Government. Another dimension of regionalism is the economic disparity between urban and rural areas. This is especially evident in the fast-developing provinces. Rapidly rising prosperity enjoyed by the urban population is contrasted with the stagnant income and lower standard of living of the rural population. Regional disparities between provinces and urban and rural areas will be an important consideration in the future political, social, and economic development of China.

3:45 GUANO: ITS ROLE AS STIMULUS TO THE MODERN FERTILIZER INDUSTRY.

Thomas D. Anderson, Department of Geography, Bowling Green State University, Bowling Green OH 43403.

Because of growing awareness of soil depletion a number of innovative approaches to soil enrichment were tried in the United States and Europe in the early 1900's. Some of these methods had contemporary dimensions in that they employed chemical analyses and recycling procedures. Beginning in 1840 the chemical discoveries of Justus von Liebig and the first commercial shipments of guano from Peru to England coincided to stimulate profound changes that led to what has become the modern fertilizer industry. This study examines the sequence of relevant technological advancements and identifies the different resource areas associated with this evolution of geographic economy. Acceptance of first guano and then nitrates as necessary materials for commercial agriculture altered world trade patterns and also had geopolitical effects. The geography of sources of phosphates and potash is treated as well. The commercial shipments of guano from Peru to England coincided to stimulate profound changes that led to what has become the modern fertilizer industry. This study examines the sequence of relevant technological advancements and identifies the different resource areas associated with this evolution of geographic economy. Acceptance of first guano and then nitrates as necessary materials for commercial agriculture altered world trade patterns and also had geopolitical effects. The geography of sources of phosphates and potash is treated as well.
were measured again. The control group showed the most growth and the carbon dioxide group showed the least, but all differences between groups were extremely slight.

9:30 HOUSEHOLD RECYCLING APPLIANCE. Jeff Smith, 2701 Grandwork Rd., Toledo OH 43617.

Recycling is the best solution to today's abundance of garbage. There are products that help people in recycling, but not one single product that separates, crushes, and stores recyclable material. The Household Recycling Appliance is a machine that is located in the base cabinets next to the sink in a residential kitchen. Light emitting diodes and photo transistors are used to separate aluminum cans, polyethylene tertephtalate (PETE), and high density polyethylene. An excess liquid collection system collects all liquid remaining in recyclable material.

9:45 RECYCLING LIGHT ENERGY USING PHOTOVOLTAICS. Venkatesh Satish, 2326 Plum Lane, Toledo, OH 43614.

The experiment was conducted to determine how effectively fluorescent light and sunlight energy, in indoor conditions, could be recaptured by photovoltaic cells, comparing amorphous silicon and crystalline silicon cells, if they were placed in 144 different locations on the walls of a classroom. The light intensity and the maximum power generated were measured at 16 points. Linear regression analyses were performed between light intensity and maximum power for both cells under both light conditions for the 16 points. Utilizing the linear regression, the maximum power that could be generated by placing the two cells in the 144 different points was extrapolated. It was determined that: 1) Measurable amounts of power were generated by both cells under both light conditions. 2) Amorphous Cells generated more power than crystalline (p.23 vs. p.30 [W/m²]) in fluorescent light conditions. 3) Under combined sunlight and fluorescent light, crystalline cells generated more power (0.456 vs. 0.470 [W/m²]). 4) Power generated by the solar cells was directly proportional to the light intensity measured, thus combined light yielded higher power generation (ANOVA p < 0.0001).

10:00 Poster Break

JUNIOR ACADEMY
1:30 PM - Saturday, April 23, 1994

Logan

Valerie Kerns, Presiding

1:30 RAD SCIENCE. Brian R. Dolin, 207 Red Dr., Chillicothe OH 45601.

Radiation can be defined as the transfer of energy by waves of particles (alpha, beta, etc.) or electromagnetic waves (visible light, x-rays, gamma, etc.). The shielding of radiation involves the prevention or minimization of this energy transfer. This requires having the proper "shield material" to absorb the energy of the given radiation. The two primary types of radiation that this project dealt with interact with matter in significantly different ways. The beta, a charged particle, interacts with matter by imparting its energy to it, while gammas or x-rays interact by photon interactions. The various interactions mechanisms require different materials to properly shield the different radiations. The attenuation of photons, gammas or x-rays, can be described using exponential relationships. The stopping of charged particles, betas, exhibit a range property. The effect that matter has on a gamma flux and to some extent betas passing through it can be represented by the mathematical expression:

Where: I = e⁻²"x" , I₀ = initial intensity of gamma flux; Iₙ = Uncoiled gamma flux after passing through x thickness of the material; µ = Total linear attenuation coefficient (in cm⁻¹).

The thickness and half-thickness values for the "I₀" gamma can be found and the range for the Sr-90/Y-90 beta can be measured via a series of counts.

1:45 HOW DO POLLUTANTS AFFECT LUMBRICUSES' BEHAVIOR? Amita P. Tamrakar, 516 Riverside Dr., Roseboro NC 43646.

Lumbricuses play a major role in rejuvinating the soil for plant growth by burrowing and digesting organic material. Acid rain and pesticides pollute the soil and may affect the lumbricuses' behavior. In this experiment commonly used pesticides like Ortho Weed Killer, Ortho Diazinon insecticide spray, Isotol insect spray, and Fungicide were prepared by running through x thickness of the material; u,=Total linear attenuation coefficient (in cm⁻¹).

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In this experiment seeds were grown in commercial potting soil and in vermicompost. The growth and health were compared. The results showed that the plants grew faster, more vigorously, and with a darker green color when grown in vermicompost, obtained by red worms, then composted kitchen food scraps in a worm composting system, than in commercial potting soil.


Antibiotics and various vitamins have been routinely added to grain feed for cattle, hogs, and poultry. The goal of these industries is to accelerate animal growth which in turn yields the farmer a higher profit when selling the market. The basis of this project was to compare the effects of tetracycline and riboflavin to growth of red swamp crayfish, Procambarus clarkii. If size increased, it might be advantageous to farm these creatures along with other sea organisms for human consumption or animal feed. Crayfish were separated into two groups (Group A 60mm, and Group B 15mm). Each containing five animal groups. Measured amounts of tetracycline (75mg, 150mg, 250mg, and 500mg) were added two times a week. One half of the tanks also received 25mg of vitamin B2. Group A was dissected after five weeks, and discolored to various glands was observed. Group B was measured once a week. Weights were obtained on a meter balance the first week and again on the tenth and final week. There was cut-off point where too much tetracycline was detrimental to growth. Largest growth was found in the tank containing 150mg of the antibiotic. This group also seemed to be the most active and healthiest. Data indicates that crayfish with developing soft shells could be farmed. However, tetracycline and vitamin B2 is changing the organs of these crayfish. How much of the antibiotic lingers in the organs should be taken into consideration since it could be passed off if consumed.

3:45 ALTERATION OF SKIN PIGMENT IN ALBINO MICE. CATHERINE B. ELL, 10355 CLEFFWOOD RD., PERRYBURG OH 43551.

The purpose of this project was to determine the possibilities of altering skin pigmentation in albino mice. The artificial method of feeding the mice substances that contain beta carotene would provide coloring in the mice. In albino mice, color is not present due to the absence of melanin. The experiment was controlled with the isolation of the mice in three separate habitats. Each mouse was fed specific quantities of food containing beta carotene. Carrots were given to mouse #1, beets to mouse #2, and normal mouse food to mouse #3. As the control. Each mouse was given a supplemental vitamin to guarantee nutritional balance. The substances were carefully measured to gauge what amount it would take to obtain coloring. After a five month period, in which different quantities were tested, there was a slight variance of color in the mice; noticeable in feet and tail. My hypothesis proved correct but non-sustaining; for the coloration measured to gauge what amount it would take to obtain coloration. After a five month period of time, in which different quantities were tested, there was a slight variance of color in the mice; noticeable in feet and tail. My hypothesis proved correct but non-sustaining; for the coloration measured to gauge what amount it would take to obtain coloration.

4:00 THE EFFECTS OF ENVIRONMENTAL POLLUTION ON MICE. KIMBERLY J. TEBBANIE, 5365 KENSINGTON RD., CARRINGTON OH 44615.

This project includes research collected over two years. The first year used motor oil, diesel fuel, antifreeze and rock salt as land pollution. The second year has not yet been completed. It uses distilled water diluted with sludge as water pollution. The land pollution data collected over a two-month period brought astonishing results. With diesel fuel and oil, the mice experienced heavy breathing bloody eyes and ears, and the death of three young offspring. With antifreeze, weight loss and bloody eyes were recorded. With rock salt, the female developed mange and hair loss which eventually led to death. The second year limited my pollution to one item sludge. This research is still currently in progress but in the past three months no polluted mice have had babies and all show weight loss. I believe the males in all polluted cages have become sterile. More valuable conclusions will be obtained after the end of my research when sacrifice and tissue analysis results are recorded.


During the past three years, continuing research has developed verifiable evidence that positive physical stimulation or denials of such can directly alter the behavior of Musculus. This study is generally produced aggressive subjects were given the positive holding and caring that preceded general absent such aggressiveness in past experiments. Two pairs of aggressive Musculeus creatures observed; each set contained one male subject and one female subject. The subjects were then paired and placed into separate containment units where they were given ample food and water. Each pair was then given positive physical stimulation and observed for any changes in behavior. All significant changes were well documented. The subjects were then able to breed and there was a generation of the F3 generation. The F3 generation was used for future experiments. The F2 generation of mice with pairs of subjects were compared to the characteristics of this generation to those of the F1 generation. One dominating female and one dominating male, one non-dominating female and one non-dominating male, one dominating male and one non-dominating female, and one dominating female and one non-dominating male were all chosen, each from the opposite F1 generation pair. The F3 generations of all the above listed matches were then observed, and any comparisons and contrasts between the generations were documented completely.

4:30 LONGEVITY INCREASE IN DIABETIC MICE TREATED WITH XENOGENIC ANTI-IGG. DAM N. PAUL, 1431 HAYES ST., BARTONTON OH 44203-7607.

The research was devised because diabetes is caused by an autoimmune response and the question was, could the response be interrupted as evidence by an increased lifespan? The spontaneously diabetic mice have virus encoded in DNA that target the beta cell for islet cell antibodies (ICA) by ten days of age. This attack causes increased mitotic activity of the beta cells peaking at seven weeks. Blood sugar elevation begins at six weeks, so humoral immune response suppression was began at four weeks. ICA's are IgG antibodies and the mice received 2.5mg anti-murine IgG subdermally, tapering for five weeks. Controls were given sterile saline. Soon the appearance of the diabetic mice changed. They became obese and polydipsic. The average life-span for diabetic mice is five to seven months. The diabetic mice receiving anti-IGG lived at five, seven, and ten months. The non-diabetic at twenty three months. Of the mice receiving saline, three died during twenty three months, the diabed died at eight months. Microscopic study revealed destruction of pancreatic islet beta cells in the diabetic mice. My conclusions were that humoral immunity is insignificant in diabetes and a study of anti-lymphocytosis serum receptors supports the importance of cell-mediated immunity.

4:30 THE EFFECTS OF BIOLOGICAL CHEMICAL ON IN VITRO MUSCLE CONTRACTION OBSERVED SPECTROPHOTOMETRICALLY. JONATHAN A. LEE, P.O. BOX 217, E. LIBERTY OH 43319.

The purpose of this project was to develop an in vitro assay of muscle contraction in order to study the effect of biological chemicals on muscle contraction. A rabbit skeletal muscle suspension was prepared by blending 20g of muscle in 200mL of 0.3KCI. The suspension was spun in a clinical centrifuge at 4000 rpm for five minutes. The supernatant was used for contraction. Contraction was measured spectrophotometrically. This in vitro contraction took place in a test tube containing 5ml of ATP and distilled water. A standard curve was developed by varying concentrations of ATP. To that was added 1ml of muscle supernatant. The tubes were put into the centrfuge for one minute and tested for the absorbency of light at 600nm. ATP concentrations did influence the absorbency results as well as chemicals such as ATPase and caffeine.

SCIENCE EDUCATION

9:00 AM - Saturday, April 23, 1994
Hardin
David E. Toot, Presiding

9:00 IMPLICATIONS OF THE USE OF TECHNOLOGY IN THE MATHEMATICS CLASSROOM. ANTONIO R. QUESADA, DEPT. OF MATHEMATICAL SCIENCES, UNIVERSITY OF AKRON, AKRON OH 44325-4002.

The newest generation of graphing calculators and computer algebra systems are transforming the way we teach mathematics. The changes are far reaching, affecting not only the teaching and learning processes, but also the content of our courses and the way we assess our students. Many valid concerns have been raised in which current research is providing some answers. We will look at the implications of bringing technology to the classroom and present the answers we found to some traditional concerns after a three-year experiment on integrating graphing calculators in the teaching of precalculus and calculus.
4:35 INTEGRATION OF THE TEACHING OF SCIENCE AND AGRICULTURE: PROJECT SYMBIOSIS. Rose Marie Rossetti, Ohio State University, Dept. of Agricultural Education, 204 AC Admin Building, 2120 Fiftieth Rd., Columbus OH 43210-1067.

Twenty-six teachers from across Ohio participated in an innovative training project that enabled science and agriculture teachers to integrate science principles into agricultural curriculum and agriculture applications into the science curriculum. Project Symbiosis, funded by the Kelllogg Foundation, was directed by faculty at The Ohio State University, Department of Agricultural Education in 1991-92. Teachers received instruction on the latest scientific advances in agriculture. Agencies and industries involved in the instruction included: O.M. Scott & Sons, Select Sires, Select Embryos, the U.S. Department of Agriculture and The Ohio State College of Agriculture. This presentation will be focused on the project's design. The teachers were selected by an application process. Teachers came to six day workshops held in central Ohio. Teachers were encouraged to travel to the workshops to meet and work with their partner teacher. The project focused on facilitating interaction and sharing between these science and agriculture teacher teams. Teachers kept monthly logs of their shared activities during the project and submitted them as evidence that training had taken place. In addition, periodic random telephone interviews were conducted by the evaluation faculty in order to determine the teachers' participation and interest in the training. Graphic facilitation and team members also participated in an international science fair with their partner teachers. The project included the development of three curriculum packages, covering the topics of mathematics, science, and agriculture. The final three day session allowed the teachers to bring their project packages to share with their students and partners.
2:45 ATTITUDES OF OHIO TEACHER EDUCATORS CONCERNING SCIENCE FAIRS. Michael G. Greve, Dept. of Education, Ohio Wesleyan University, Delaware, OH 43015.

A questionnaire was sent to all science teachers educators in Ohio with a return rate of 35%. Secondary science certification programs offered an average of 2 hours of instruction on science projects for their preserves teachers, but this varied from 0 to 10 hours depending on the university. Elementary certification programs averaged 7 hours of such instruction with a range of from 0 to 45 hours. Teacher educators favored using groups of 3-4 students at early ages. This group preference gradually shifted to individual projects as grade level increased. About 85% of the teacher educators had taught at the pre-college level and about half of those had at least one student participate in a distinct science day. Teacher educators who participated in a science fair themselves as a student were 50% more likely to have had students who participated in a science fair. This was a high school unit. In agreement among science teacher educators that science fairs have value in modern school programs, that projects teach scientific methods, that projects give valuable experience in communication skills, that the opportunity to explain research to an outside observer enhances interest, compatibility with constructivist views of learning, and that preservice teachers at all levels should be given some instruction on how to structure independent research projects. Teacher educators were divided about the effect of large cash prizes on the purposes of science fairs, the value of rating the projects, whether science fairs put too much pressure on students, the quality of the judging at science fairs, value as an evaluation tool for OBE, value without a mentor scientist, and whether the lessons taught by such projects are more effective than good classroom instruction.

3:00 THE INTER-CORRELATION OF STUDENTS’ QUIZ SCORES IN A HUMAN LEARNING SEMINAR. Ralph F. Darr, Jr., Room 301 N, Zook Hall, University of Akron, Akron, OH 44325-4208.

Over the past twenty years, the author has developed a three fold system for assessing instructional effectiveness. Correlations were computed between students’ scores on five, newly constructed 25 item unit quizzes. The graduate seminar which meets sixteen times is organized into five units. All five unit quizzes were designed to cover all topics taught in the course pretests, unit quizzes, and students end-of-course evaluation of the instructor and instruction. Scores on the unit quizzes were found to be significantly inter-correlated for both the undergraduate educational psychology course and the graduate human learning seminar but not for the graduate psychological foundations course. Last year the author extensively revised the human learning seminar. A new test was introduced, new study questions composed, and new quizzes constructed. This study is designed to assess the inter-correlation of scores on the five, newly constructed 25 item unit quizzes. The graduate seminar which meets sixteen times is organized into five units. All five unit quizzes were designed to cover all topics taught in the course, 2. A Science requirements choice of Environmental Chemistry, Biology or Geology 3. A Humanities requirement: choice of Nature & Literature, Environmental Ethics, American Federal Government Issues and Policy, 4. A Social Sciences requirement: choice of Current Economic Issues, Social Problems, Environmental Psychology, and 5. Advanced Environmental Studies, including projects and/or community service. The Environmental Studies course has been given once to great student satisfaction. Supported by grant 91-M-010 of the Ohio EPA Environmental Education Fund.


Budget, scheduling and logistical problems are often cited as reasons for not including ecological studies in large introductory college courses. Many elementary and secondary school teachers learned about tools that would help them adapt to change: available resources for use in collaborative learning settings, alternative assessments appropriate to such settings, techniques for integrating sciences and facilitating the construction of learning among students. Monthly meetings bringing in community experts on environmental topics, activities for applying the environmental information in high school science, and peer teachers eager to share ideas. This paper will focus on the benefits of such an Eisenhower program for preparing teachers for positive curriculum change, and the value of the Earth Systems approach for constructing relevant, integrated science learning.


One of the major purposes of graduate education is to develop research skills and become involved in the academic culture. Frequently, the relationship between a graduate assistant and a faculty member is the making or breaking of this very important educational experience which has long term implications. The purpose of this study was to investigate the level of congruence between graduate student expectations and the expectations of faculty to whom they are assigned. More specifically, the researchers investigated graduate assistant roles and skills expectations, student expectations and the expectations of faculty to whom they are assigned. More

4:00 EARTH SYSTEMS EDUCATION AS HIGH SCHOOL SCIENCE. Rosanne W. Fortner, Ohio State University, School of Natural Resources, 200 Coffey Rd., Columbus OH 43210.

During the 1982-83 and 1983-4 school years, approximately 30 teachers from twelve school districts in central Ohio were brought together monthly by a grant from the Eisenhower program for teacher enhancement in science education. The focus of the project was the Biological and Earth Systems Science (BESS) curriculum being implemented by Worthington high schools as an interdisciplinary, systems-oriented two year course that replaces traditional biology and earth science. Teachers representing the various districts thus met to learn about curriculum restructuring from those who were most familiar with its promise and its pitfalls. As the State was preparing to release its model competency-based science curriculum, the teachers learned about tools that would help them adapt to change: available resources for use in collaborative learning settings, alternative assessments appropriate to such settings, techniques for integrating sciences and facilitating the construction of learning among students. Monthly meetings brought in community experts on environmental topics, activities for applying the environmental information in high school science, and peer teachers eager to share ideas. This paper will focus on the benefits of such an Eisenhower program for preparing teachers for positive curriculum change, and the value of the Earth Systems approach for constructing relevant, integrated science learning.

4:15 GLOBAL CHANGE IN THE GREAT LAKES: A NEW CURRICULUM PACKAGE FOR SECONDARY SCHOOLS. Rosanne W. Fortner, Ohio Sea Grant Education Program, 059 Ramsey Hall, 29 W. Woodruff Ave.

In 1992, Ohio Sea Grant published a set of scenarios for educators and decision makers dealing with global warming is likely to affect the Great Lakes region. Topics considered included impacts on water resources, biological diversity, forests, agriculture, shipping, recreation, air toxics, estrophication, fish, and estuaries. All the Scenarios were based on scientific projections and social changes identified by experts, and all are based on the premise that lake levels, unlike sea levels, are likely to drop measurably. Using an Earth Systems approach to integrative and collaborative science, new curriculum materials developed by the Ohio Sea Grant Education Program will assist teachers in dealing with some of the complexities of issues such as global change. Use of existing Sea Grant materials will be discussed in relation to how they can be easily modified to address similar issues.


The Rocky River Nature Center of Cleveland Metro parks has established a volunteer water quality biomonitoring program for the Rocky River ecosystem. The program began in 891 with 30 volunteers monitoring 8 river sites and has grown to 45 volunteers monitoring 14 sites. Water quality is determined by sampling macroinvertebrates using a modified version of the Ohio’s Scenic River Stream Quality Monitoring Program. Sampling is done once a month from April through October. Water quality data is kept on file at the Rocky River Nature Center and is also sent to the Ohio EPA and Cleveland Metro parks Wildlife division. Public involvement in this program has led to a greater appreciation for the life of the river and a greater sense of responsibility to protect and conserve this ecosystem. The nature center has used the volunteer program to develop public slide and video presentations to educate and involve others with the program.


The chemistry of stratospheric ozone spans a wide range of chemistry: ultra violet activation and absorption, kinetics of reaction, phase diagrams, etc. This will be reviewed. Attendees will be able to order a complete set of slides, with references, plus background material.


Upon the advice of two environmental science consultants, Otterbein College has devised an Environmental Science major that prepares students for graduate programs or entry level industry positions that require environmental science backgrounds. Additionally, an interdisciplinary Environmental Studies minor is proposed consisting of: 1. An Environmental Studies course, 2. A Science requirements choice of Environmental Chemistry, Biology or Geology. 3. A Humanities requirement: choice of Nature & Literature, Environmental Ethics, American Federal Government Issues and Policy, 4. A Social Sciences requirement: choice of Current Economic Issues, Social Problems, Environmental Psychology, and 5. Advanced Environmental Studies, including projects and/or community service. The Environmental Studies course has been given once to great student satisfaction. Supported by grant 91-M-010 of the Ohio EPA Environmental Education Fund.
SO₂ REMOVAL THROUGH ION EXCHANGE RESIN ‘BUFFERED’ AQUEOUS SOLUTIONS. Hari K.V. Krishna, Sreedhar Varanasi, Steven E. LeBlanc, Dept. of Chemical Engineering, University of Toledo, Toledo OH 43606.

This study proposes a novel technique for sulfur dioxide removal from flue gases. The process involves the absorption of SO₂ into an aqueous medium that is buffered with suspended ion exchange resin (IER) particles. This approach leads to superior SO₂ removal compared to the conventional sulfite-based regeneration absorption process. The improved performance is due to the rapid removal of the H⁺ ions resulting from SO₂ hydrolysis from the aqueous medium via the ion exchange process. The process also serves to reduce the SO₂ hydrolysis in the forward direction, thus leading to enhanced SO₂ absorption. In addition, the regeneration of the IER can be accomplished much more easily than the recovery of dissolved reagent in sulfite-based process. The absorption studies were conducted in agitated slurry reactor and packed hollow fiber contactor (PHFC) systems using three types of resins: strong base gel-type, weak base gel-type, and weak base macroporous resin. Gel-type weak base resin exhibited higher SO₂ sorption capacities. Also, the IER-buffed slurry absorption system proved to be better for SO₂ removal than either pure H₂O or sulfite solution. Dual site sorption mechanism seems to be operative based on the equilibration studies with mono and difunctional acids. Novel packed hollow fiber contactors were tried in place of the standard three-phase slurry reactor arrangement commonly employed in gas-liquid-solid systems due to their attractive operational and design features.

10:30 DESIGN OF A NONLINEAR pH CONTROLLER. SUMEDHA DESAI, DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSITY OF TOLEDO, TOLEDO OH 43606.

Environmental considerations make the control of the pH of waste effluents an important industrial problem. The neutralization of a waste effluent is a nonlinear process. As the neutralization point is reached the pH of the effluent is very sensitive to additions of acid or base. The highly nonlinear nature of the process makes it very difficult to maintain the effluent pH at the desired value (the pH set point). Conventional controllers, such as PI or PID, typically perform very poorly in this type of application. This control problem is overcome by using an online estimation of the titration curve from continuous pH measurements. The estimated titration curve is then used to determine the control criteria from the nonlinear model for the neutralization process. Computer simulations are used to evaluate the performance of the controller, for a hydrochloric acid-acetic acid sodium hydroxide system.

10:45 GROUND WATER QUALITY MONITORING IN THE PRESENCE OF TEMPORAL AND SPATIAL VARIANCES. Zehnel A. A. N. ANDRAKOULI, DR. M. N. NICHOLLS, UNIVERSITY OF TOLEDO, INDUSTRIAL ENGINEERING DEPT., 2801 W. BANCROFT, TOLEDO OH 43606.

Developing a good statistical test for monitoring the possible ground water contamination from waste facilities requires controlling the facility wide false positive rate and accounting for all types of inherent variability, such as spatial, temporal, and sampling, while maintaining a high power to the real contamination. The common practice is comparing individual observations from the down gradient (DG) to the average value of the background (BG), where BG can be formed in different ways. However, this procedure is not valid in the presence of spatial variation. The proposed procedure, use of paired observations between the up gradient (UG) and DG wells, accounts for the spatial and temporal variations. Since more than one parameter is being monitored at several locations, simultaneous statistical procedures need to be used to control the over all risk. The common practice is the use of Bonferroni technique to spread the facility wide false positive rate to over all parameters and wells. This practice tends to be conservative which is reflected when looking at the DG-U complexity due to the comparison induced by comparing UG-DG differences to the BG. Alternately, a generalization (p of m) of multiple comparison with control can be used. The technique is valid when there is no spatial variability and one UG well in the BG. The method is being extended to the case where DG has multiple UG in the presence of spatial and temporal variability.

10:30 NOISE POLLUTION AT CONSTRUCTION SITES. Shaik Husan, PH.D., P.E., ASSISTANT PROFESSOR, CIVIL AND ENVIRONMENTAL ENGINEERING DEPT., YOUNGSTOWN STATE UNIVERSITY, YOUNGSTOWN OH 44555 and EAMO HAID-TAKIM, B.E., CIVIL ENGINEERING STUDENT, YOUNGSTOWN STATE UNIVERSITY, YOUNGSTOWN OH 44555.

Although construction workers are a small portion of all industrial workers, they account for a large portion of current fatalities and disabilities. One of the reasons for this high incidence of tragedy is a high level of noise that accompanies the construction activities. A basic knowledge of sound, loudness, and sound level measurement provides a background for judging the effects of noise on the work environment. This paper presents the effects of noise on the worker productivity, resulted increased cost of production, and how these factors are incorporated in the design and implementation of a noise control strategy.


A two dimensional optimization based model was formulated to calculate forces and moments at ankle, knee, hip joints, predict forces of back muscles and at the L3 level disc during dynamic and static pulling up/down tasks. Eight human subjects have been used in this study. Sixteen different tasks were performed for each subject, eight for pulling up and eight for pulling down with weight starting from 2kg, 4kg, 8kg, 8kg. Kinematic data have been obtained by using Motion Analysis System, and the reaction forces and moments have been obtained from an ANTI force plate. Muscular activities during pulling up/down tasks were recorded by using surface electromyography. A linear relationship between the predicted forces and the corresponding EMG values was observed for each muscles at L3 level. The disc compression force showed a linear relationship with erector spinae muscle group. The forces and moments at ankle, knee, hip and low back joint increased with the external load increasing from 2kg to 8kg. The results support earlier findings that dynamic pulling up/down activities are more stressful as compared to the static tasks.

ENGINEERING: ELECTRICAL, INDUSTRIAL, CIRCUIT DESIGN & MEDICAL APPLICATIONS

1:45 PM - Saturday, April 23, 1994
Health Education Room 100
James B. Farison, Presiding

1:30 ELECTRICAL ENERGY CONVERSION. Anthony P. Messuri, 1786 Basile Ave., Youngstown OH 44514.

Ocean thermal energy conversion systems represent an alternate, although unconventional, energy source. Unlike traditional land based solar energy systems, which require huge land areas for man-made collectors and storage facilities, a solar sea power plant uses the ocean itself as a natural collector: unlimited in size, without requiring large energy storage facilities. Electrical power produced from the thermal energy stored in tropical oceans would then be transmitted by underwater cable from off-shore platforms to the mainland. The general concept of a solar energy conversion system using ocean thermal differences appears to have the potential to compete economically with other technologies, perhaps just as important are the positive safety aspects and the pollution-free effects on the environment possessed by a solar sea power plant. The basic components of a thermal energy conversion system are discussed. The operational operation of an ocean thermal energy conversion system is investigated and a comparison of different system design efforts is summarized. However, before the economics of a solar sea power plant can be realistically evaluated, consideration must be given to the potential plant site's ocean current velocities, wind patterns, and tropical storm strength, all of which may adversely affect the plant's permanent anchoring.

1:45 AN ALGORITHM FOR ECONOMIC GENERATION PLANNING. Mohini Ahmada, PENNSYLVANIA STATE UNIVERSITY AT ERIE, BEHERND COLLEGE, SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY, STATION RD., ERIE PA 16563-1200.

Utility companies plan their generation schedules with load flow analysis. For economic generation planning it is possible to formulate a mathematical cost minimization problem with load flow equations as equality constraints and line loading limits and generator limits as inequality constraints. Such a problem is called an optimal load flow problem. The overall problem involves real as well as reactive powers. Real powers are more sensitive to bus voltage angles and reactive powers are more sensitive to bus voltage magnitudes. The problem can, therefore, be decomposed into two sub problems, one dealing with real powers and the other with reactive powers. The formulations is presented in this paper: Approaches to minimize costs for time and space are discussed and a method for convergence of the sub problem solutions to obtain the solution of overall problem is presented. Successful results on an IEEE power system are presented.

2:00 STRUCTURE OF AGAROSE GELS SUBJECTED TO ELECTRIC FIELDS AS PROBED BY SMALL ANGLE NEUTRON SCATTERING. Stephen S. Nichols, A. Plopus Andrews, S. Krueger, and R. Nooss, Box 2371, COLLEGE OF WOOSTER, WOOSTER OH 44691.

Small angle neutron scattering was used to determine the structure of agarose gels subjected to varying electric fields. The measurements were made using the 30 meter small angle neutron scattering spectrometer at The National Institutes of Standards and Technology in Gaithersburg, MD. Differential scattering cross-sections have been obtained for the Q range...
between 0.003 Å and 0.02 Å, corresponding to length scales between 300 Å and 2100 Å, and for electric fields between 0 and 45 volts per centimeter. Subtle changes in isotropic scattered intensity for small angles were evident as the electric fields were varied between alternating and direct current, and as the electric field strengths were varied. The results show no evidence of a preferential alignment of the argon matrix in the direction of the imposed field for these length scales, but the changes in isotropic scattering suggest that alignment may occur for much longer length scales.


Ground samples of silicon carbide particulate-reinforced aluminum matrix composites were investigated to statistically study the surface roughness in relations to three independent factors (SIC content, feed rate, and depth of cut) at two levels each. The grinding was performed by a surface grinder. The average surface roughness values (Ra) were determined by a surface profilometer. The roughness measurements were based on an analysis of variance (ANOVA) to assess the effects of the factors upon the surface roughness of the ground samples. The variance ratios (the F-statistic values) for SIC content, feed rate, and depth of cut were calculated as 22.03, 0.97, and 0.25, respectively, for the case in which the roughness was measured in the direction of grinding path (Case I). When the roughness was measured in the transverse direction to the grinding path (Case II), the variance ratios of the three factors became 5.80, 1.71, and 0.17, respectively. It is concluded that the SIC content is the most significant factor determining the grindability of the SiC/A1 composites, at 95.9% and 95.0% confidence levels respectively for Cases I and II. To gain an insight into the relation between the surface roughness and the material constituents, the composites were metallographically prepared and then scratched by a Vickers microhardness indenter to simulate the grinding operation. Scanning electron microscope (SEM) is being used to study the surface reveal to the deformation modes of the hard reinforcements (SiC) and the soft matrix (Al). A material removal model for the grinding of the SiC/A1 composites will be proposed.

2:30 TOTAL QUALITY MANAGEMENT AND INFRASTRUCTURE. NASIR HUSAIN, SENIOR CIVIL ENGINEERING STUDENT, JMI UNIVERSITY, 508/21 ZAKIR NAGAR, OKLA, NEW DELHI 110025, INDIA.

Over the past several years, the term infrastructure has gained much publicity. News stories indicating decaying bridges, roads, and sewers has increased the public interest. There are several factors that are responsible for crumbling infrastructure. First, it is approaching its expected design life. Secondly, the funds available for the regular maintenance are insufficient. Consequently, the structure is allowed to deteriorate to the point at which maintenance is ineffective and reconstruction is the only feasible alternative. This is at a very high cost of replacement and in astronomical. However, the cost of rehabilitation is not small either. Several approaches can be implemented to improve the quality of the infrastructure under the current budget situations. This paper will present the general overview of the current state of our infrastructure. In addition, the concept of total quality management technique and its potential to improve the quality of our infrastructure will be discussed.

2:45 POSTER BREAK

3:15 A CMOS VLSI SUBSYSTEM FOR HIGH SPEED REAL-TIME ALARM CLOCK. VEKATRA RAMANA VEMPATI, VIJAYA RAMADoss, EDWIN D. SMITH, DEPT. OF ELECTRICAL ENGINEERING, UNIVERSITY OF TOLEDO, TOLEDO OH 43606.

High-Speed alarm clocks are required in atomic applications and modern satellites. The design is accomplished using single poly double-metal 2um CMOS technology with Mentor Graphics Generator Development Tool (GDT). The alarm clock is a countdown timer with adjustable time divisions. The timer is preset to the required time and starts counting down to zero when a clock pulse is applied. A negative edge-triggered D-flip-flop with active high and active low clear and preset inputs respectively is the core element which is designed using the Lx Standard Cells. The output delay of this element is 0.2ns. The flip-flop is cascaded to form divide by six, divide by sixty and divide by thousand counters that are connected together with the control and reset circuitry which consists of a ring counter and a master reset circuit to complete the design. The delay times for each of these counters was less than 1ns. For NAND gates it was 0.8ns. The Silicon layout of the design was done using AutoCells. A new router for the circuit was implemented to improve the quality of the infrastructure under the current budget situations. This new router was connected to the frame and it was simulated and verified to work fine.

3:30 CMOS FIFO IMPLEMENTATION OF 64 X 4 ASYNCHRONOUS FIRST-IN-FIRST-OUT MEMORY. VEKATRA RAMANA VEMPATI, VIJAYA RAMADoss, EDWIN D. SMITH, DEPT. OF ELECTRICAL ENGINEERING, UNIVERSITY OF TOLEDO, TOLEDO OH 43606.

The FIFO is a serially accessed storage device with independent write-in-read-out capability. Data words are stored within the FIFO in the order in which they are written into the memory. Words are read out of the stack in the same order that they are put in, i.e., the first word written-in is the first word read-out. High-speed FIFOs are designed with TTL circuitry whereas low power devices are designed with CMOS circuitry. The design, layout and simulation of the FIFO is accomplished using a Single Poly Double-Metal 2um CMOS technology with Mentor Graphics Generator Development Tool (GDT). ARCHITECTURE OF THE FIFO: The FIFO design is carried out in three stages. The first stage involves the design of the basic memory element which is a NOR latch. All the logic gates were designed using Lx Standard Cells. The second stage is extended to a 4 x 4 FIFO both at the schematic and layout levels. At this stage the transistor sizes are adjusted for minimum propagation delay of the circuit estimated to be 0.2ns for the NOR-latch. The silicon layout of the 64 x 4 FIFO is generated using AUTOCELLS in the final stage and the circuit area was estimated to be 5711 sq.um. The simulation is carried out using Lsim in the ADEPT (automatic dynamic electrical partitioning of transistors) mode of the simulation which takes into account the various delays (due to parasitic capacitances etc.) associated with the circuit and the propagation delay of the final layout was found to be 1.1ns. The simulation of the schematic and the layout of the 64 x 4 FIFO were done and the final layout was giving expected results at optimum levels in terms of speed. Finally the layout was connected to the frame and it was simulated and verified to work fine.

3:45 ION IMPLANTATION FOR DOPING IN INDIUM PHOSPHIDE. RAVI K. NADdELLA, DIV. OF ENGINEERING AND COMPUTER SCIENCE, WILBERFORCE UNIVERSITY, WLBERFORCE OH 43564.

Indium phosphide (InP) is an attractive semiconductor because of its properties like high frequency response, high radiation tolerance, high breakdown voltage. To make electronic devices in InP, doping with impurities has to be done to obtain n-type, p-type, and high resistance layers. Ion implantation, where impurity atoms are energized and selectively bombarded onto the material, is an attractive doping technique to obtain these layers. Ion implantation of Si, Be, and Fe atoms has been used to obtain these layers, respectively, in InP. Amongst the three, Si has been proved to introduce the least damage due to ion implantation. SI implanted samples gave high activations and thermally stable electron profiles. In samples implanted with Be, low activations were measured. Be diffusion both in and out and resulting in unpredictable hole profiles. However, by using P coimplantation, Be diffusion was reduced. Fe also diffused both in and out in Fe implanted samples. But, when the implantation was done at an elevated temperature, low diffusion and high resistivities were obtained.

4:00 FABRICATION OF A P-N DIODE IN INDIUM PHOSPHIDE USING ION IMPLANTATION. RAVI K. NADdELLA, WILBUR L. WHEELER, AND JOY L. JOHNSON, DIV. OF ENGINEERING AND COMPUTER SCIENCE, WILBERFORCE UNIVERSITY, WLBERFORCE OH 43564.

A p-n diode is used as a switching device in high power electronic applications for their high breakdown voltage, low on-state resistance, and low off-state capacitance. A p-n diode was fabricated in indium phosphide (InP) to take advantage of InP’s superior properties such as low carrier ionization coefficient, high frequency response, high thermal conductivity, high radiation tolerance. Ion implantation was used to fabricate the p-n diode as it offers good control over the doping profile. SiP and Si implants were performed into semi-insulating (i-type) InP substrate to obtain p-type and n-type regions of the diode, respectively. P coimplantation was used to reduce the diffusion of Be during annealing. The implanted material was annealed to remove the damage caused during ion implantation. Ohmic contacts were made to the p- and n-type regions by evaporation and subsequent alloying of Au and Au-Be alloys, respectively. The diode was characterized for its performance. A forward resistance of 2.4 Ohms (at 100 mA) and a breakdown voltage of -120 V were measured.

4:15 AN INSTRUMENT FOR THREE DIMENSIONAL X-RAY MICROSCOPY. DAVID A. REMANN, SEAN M. HAMES, AND MICHAEL J. FLynn, DEPT. OF RADIOLoGy, HENRY FORD HEALTH SYSTEM, DETROIT MI 48202.

The description of an instrument for three dimensional (3D) x-ray microscopy is a powerful tool for evaluating microscopic detail of optically opaque structures, and was quite popular before electron microscopy (EM) became available. While EM has an advantage in two dimensional imaging, the use of x-rays has advantages in penetrating thicker specimens and in the ability to give absolute density measures. Using methods extended from those in clinical x-ray tomography scanners, a 3D array of data is created with resolution (full width half maximum) down to 25 microns in each direction for a 3 mm specimen. We are currently refining this instrument to resolve 5 micron detail in three dimensions for a 1.25 mm specimen. The 3D nature of this data is being used to analyze stereologic measures of anisotropic structures and for visualization of complex features found in biologic specimens. The ability to analyze internal structures of wet, intact specimens is an important aspect of this instrument. The current biomedical applications involve the imaging of bone and cartilage for subsequent stereologic evaluations. Applications include the study of biology in include nondestructive testing of industrial parts and materials science, especially of ceramic and plastic materials.

4:30 APPLICATION OF FILTERING TECHNIQUES TO MULTISPECTRAL IMAGE SEQUENCES OF CYTOLoGIC SAMPLES. JAMIE L. BERGMANER & JAMES B. FABSON, DEPT. OF ELECTRICAL ENGINEERING, UNIVERSITY OF TOLEDO, TOLEDO OH 43606.

Simultaneous diagonalization (3D) filtering is applied to multispectral grey-scale image sequences of stained cytologic (cellular) samples from the human body. The stained samples contain cells which vary in color content. They may also contain small proteins or blood vessel material resulting from the method used to create the sample slide. Image processing is introduced as an aid to the cytologists who examine and diagnose the cytologic samples.
The purpose of applying filtering techniques is to create a single resultant image of a given cytologic sample such that desired features have been enhanced and interfering features have been suppressed. Spatially invariant multispectral gray-scale image sequences of the samples are formed by holding the relative slide-image sensor position constant while varying the wavelength of the light at which each image is taken. SD filtering is then applied to the image sequences. Results show separation of overlapping cells and suppression of interfering features such as blood and proteins. Several different sample slides and filtering situations are considered in this project.

4:45 COMPRESSION AND RECONSTRUCTION OF RENAL GRAM IMAGE SEQUENCES. Mark E. Shield & James B. Farison, Dep. of Electrical Engineering, University of Toledo, Toledo OH 43606.

This paper reports results of the compression and reconstruction of a very noisy image sequence, the renalgram. A renalgram is a nuclear medicine image sequence which studies the chemical processes of the kidney over a fixed period of time to diagnose various kidney disorders. The renalgram is obtained by the temporal variation of a radioactive tracer in the renal system. With no patient motion the renalgram is a spatially invariant image sequence with all of the features in the image sequence in the same spatial position in each image of the sequence. A technique called simultaneous diagonalization (SD) filtering is applied here to a very noisy 180-image renalgram sequence for compression to a much smaller image set. Due the extremely noisy nature of renalgram image sequences, SD image sequence filtering is combined with traditional methods such as median filtering and spatial averaging and/or weighted and unweighted temporal averaging methods, which are applied to the image sequence prior to application of SD to enhance the reconstruction. The resulting image reconstructions illustrate the potential of this combination of methods.

Environmental Sciences and Resources Management Division

ENVIRONMENT: POLICY AND QUALITY

1:30 PM - Saturday, April 23, 1994

Allen

Ralph E. Ramey, Jr., Presiding

1:30 PRESERVING OHIO'S BIODIVERSITY - A REPORT ON THE FIRST TWO DECADES OF NATURAL AREA AND SCENIC RIVER PRESERVATION. Ralph E. Ramey, Chief, Ohio Dept. of Natural Resources, 1389 Fountain Square, Columbus OH 43224.

Since the passage in 1970 of landmark natural areas legislation, the Department of Natural Resources has been working to preserve the biodiversity of Ohio through programs of natural areas, scenic rivers and endangered plant protection. In contrast to other programs of the Department which are either regulatory or very anthropocentric aimed at maximizing opportunities for various outdoor recreational activities, the programs of the Division of Natural Areas & Preserves are almost exclusively biocentric aimed at saving forever the best remaining examples of Ohio's natural heritage. Through acquisition and dedication, over 20,000 acres of prairies, forests, wetlands and river corridors have been given permanent protection. From small sites protecting a single "listed" species, to large bioreserves that protect a fine example of a natural community and habitat for endangered plants and animals remain yet unprotected.

1:45 TRANSPORTATION OF HAZARDOUS WASTE: AN ASSESSMENT OF OHIO REGULATORY PROFESSIONAL ATTITUDES TOWARD RISK AND IMPLICATIONS FOR PUBLIC POLICY. John M. Scherrer, Ohio Environmental Protection Agency, Division of Hazardous Waste, P.O. Box 1049, 1800 WaterMark Dr., Columbus OH 43266-0149.

Ohio utilizes dual authority to implement its hazardous waste transportation regulatory program. The Ohio Environmental Protection Agency (Ohio EPA) and the Public Utilities Commission of Ohio (PUCO) each have unique roles in this program, with no formal agreement between the two for regulatory coordination. Ohio EPA primarily regulates the operations facilities of transporters, while PUCO focuses on regulating transport vehicles on the highways. The purpose of this study was to identify and numerically rank hazardous waste transportation risk factors, to measure whether attitudes toward these and other environmental risk factors differ among regulatory personnel from Ohio EPA and PUCO, to assess the degree of coordination in regulating hazardous waste transportation that exists between the two organizations, and to assess any potential impact that differences in attitudes or in lack of communication might have on the effectiveness of Ohio's hazardous waste transportation regulatory program. A questionnaire was used to measure individual attitudes toward transportation risk factors and toward the overall risk posed by transportation of hazardous wastes compared to other environmental issues, to determine the level of coordination between Ohio EPA and PUCO, and to assess how these issues might affect public policy in Ohio.

2:00 POSTER BREAK


Spatial and temporal patterns of epilimnetic photosynthesis were examined along a trophic axis extending from the upper basin of Sandusky Bay (SB) to the central basin of Lake Erie (LE) during 1993. Uptake of 14C-bicarbonate was measured in a photosynthetron to determine photosynthesis vs. irradiance. Photosynthetic parameters were determined using the equations of Talling (1957) and Platt (1980); photosynthetic capacity (P), apparent quantum efficiency (a), and light inhibition (i). Photosynthetic inhibition (i) of the central basin of Lake Erie consistently exhibited surface photoinhibition, an effect not observed at the Sandusky Bay sites. In May, total areal carbon flux through the photosynthetic pathway in Sandusky Bay was approximately an order of magnitude higher than carbon flux through this pathway in Lake Erie. This difference between the Sandusky Bay and Lake Erie sites diminished during the growing season, especially in the Sandusky sub-basin of the central basin of Lake Erie. This study was supported by Ohio Sea Grant AVE-5.

3:00 LITTER MACROINVERTEBRATE DIVERSITY IN THE MANAGED FOREST LANDSCAPE OF WESTERN MARYLAND. Ronald R. Bailey and Brian C. McCarthy, Dept. of Environmental and Plant Biology, Ohio University, Athens OH 45701.

As a result of standard forest management practice, much of the hardwood forest landscape of the central Appalachians represents a mosaic of even-aged patches in different stages of successional development. Pitfall trapping was used to determine the effects of forest development stage on litter macroinvertebrate diversity. Twelve stands, in four development stages (clearcut, pole, mature, and over mature), were studied in the Savage River State Forest, Garrett Co., MD. In each stand, pitfall traps were placed in two previously established 25 x 50 m permanent plots. Sampling was done in two micro sites—a log and on the open forest floor. Samples were collected in May, June, July, and August of 1992 and all specimens were identified to the lowest possible operational taxonomic unit (OTU). Brillouin's diversity index (HB) were used to assess patterns of invertebrate diversity. Stand development stage was found to have a highly significant effect on diversity (ANOVA, p < 0.0001). Clearcuts had the greatest average diversity (HB = 4.63), followed by relative to pole (HB = 4.00), mature (HB = 3.90), and over mature (HB = 3.60). However, each development stage had its own set of unique fauna, suggesting that all of the stages are important in the forested landscape. The effect of moisture was strong but not significant (ANOVA, p < 0.0684). This trend might be intensified through alternative forest management practices that increase structural heterogeneity in the forested landscape.

3:15 SUCCESSION OF ARTHROPODS ON CARRION IN OHIO. Carla M. Price, Dep't. of Biology, Denison University, Granville OH 43023.

Forensic entomology is a field which has made frequent contributions to recent criminal investigations by helping determine post mortem interval, or time since death. The species of insects found on a corpse and their succession patterns are heavily dependent on geographic location and microclimate. A thorough literature search revealed no previous analyses of carrion fauna in Ohio. The goal of this project was to document the time dependent succession of insects on carrion exposed to different environmental conditions. The following investigations were conducted: the four-year investigation at Denison University's Biological Reserve to provide essential baseline data to which evidence collected from Ohio crime victims can be compared. Stillborn pigs (Sus scrofa) were obtained from a local farmer within twenty-four hours after death and placed in two-foot square wooden cages that were covered with hardware cloth to prevent interference by non insect species. One pig was photographed at various decay stages, but remained undisturbed otherwise. Variables such as carcass condition, decay stage, weight, body temperature, pig/soil interface temperature, ambient temperature, rainfall, and frequency and species of insects present were recorded twice daily from the other pig. Insects were collected, preserved, and identified. Over 25 species primarily representing Staphylinidae, Staphylinidae, Dermestidae, Callichondidae, and Scarabaeidae were collected through the autumn. Additionally, large aggregations of Alydus (sp.) were observed feeding on the pigs.


Hexagenia nymphs were characteristic of the soft bottom sediments of the shallower regions of Lake Erie until the mid-1950s. In the western basin they attained local densities >1,000/m², averaging near 400/m². Nutrient loading and subsequent increased oxygen demand and created occasional summer anoxic conditions near the bottom which extirpated the nymphs from the lake. Nymphs were not reported from the lake from 1955 until 1992. Hexagenia adults began to appear in noticeable numbers in 1992 along the shoreline of the western basin. In 1993 we surveyed nine sites in the eastern half of the western basin, where the nymphs were last seen prior to the 1950s, to determine the distribution and density of nymphs in the sediments. Triplicate grab samples were collected at each site in June, July, and September. Adult emergence was monitored qualitatively. Nymphs were sparse at four sites near South Bass Island and were not found at the other five sites. Calm weather permitted oxygen depletion to
near 2 mg/L, perhaps lower, in the bottom waters. Nymphs were not recovered in the September samples, which suggests that they may have succumbed to low oxygen conditions. Adults emerged primarily in late June and early July, but a few continued to emerge until late August. Our results indicate that conditions at the bottom of the western basin are marginally suitable for Hexagenia and that the success of its recolonization remains tenuous. Its reappearance in the lake indicates gradual improvement in oxygen conditions and perhaps a decline in sediment toxicity.


We studied annual patterns in Peromyscus leucopus densities in a two-harvest woodlot in Northwestern Ohio. P. leucopus had been live-trapped from 1972 to 1992, and showed a seasonal pattern of population density, peaking from July to August and declining to a low between December and March. Population peaks varied from 27 to 181 individuals, and troughs varied from 4 to 46 individuals. This variability in density was studied using univariate Box-Jenkins time series models. Based on preliminary analyses, current densities were correlated with previous densities with lags of one and twelve months, explaining 81% of the variability in density. In addition, the effect of regional weather on P. leucopus densities was studied using multivariate time series analysis. A principal component analysis was run on 13 weather variables, yielding three principal components that were interpreted as temperature, precipitation, and extremes. The extremes component included temperatures above 32°C and below -18°C, and snowfall. Based on preliminary analyses, the extremes component had a negative effect on density with a two month lag. The temperature and precipitation components both had a positive effect on density consistently with a one month lag. It is not yet clear how much of the variability in density is explained by weather. Future studies will attempt to incorporate past densities and regional weather into one model predicting future P. leucopus densities.

4:00 STATUS OF THE FEDERALLY ENDANGERED ALABAMA CAVE SHRIMP, PALAEOMONIAS ALABAMEAE SMALLEY (DECAPODA: CARIDEA: ATYIDAE). H. H. Hobbs III, DEPT. OF BIOLOGY, WITTENBERG UNIVERSITY, PO Box 729, SPRINGFIELD OH 45502-0729.

The troglobitic Alabama Cave Shrimp, Palaeonomas alabamae and the only other member of the genus, Palaeonomas garteni Hay (Kentucky Cave Shrimp), are listed as Federally Endangered Species due to small populations in a limited number of localities. Historically, P. alabamae was known only from two localities in Madison County, Alabama but has not been observed in the type locality since November 1973. Loss of the guano food base in this cave because of the disappearance of the Grey Bat, Myotis grisescens Howell, and/or water contamination by pesticides may be the explanation for the apparent extirpation of shrimp from this site. Field work initiated by the U. S. Fish and Wildlife Service resulted in the discovery of additional populations in three Madison county hydrologically connected caves in October and November 1991 by members of the Geological Survey of Alabama. It is recommended that water quality monitoring resume and that additional tracer-dye studies be conducted in order to define more precisely the range of the sites. Known populations are being monitored and search for additional localities continues.

4:15 HUMAN DISTURBANCE AND NESTING SUCCESS IN GREAT BLUE HERONRIES OF NORTHEAST OHIO. Becky A. Carlson and E. Bruce McLean, DEPT. OF BIOLOGY, JOHN CARROLL UNIVERSITY, UNIVERSITY HEIGHTS OH 44118.

Nineteen Great Blue Heronries (Ardea herodias) were studied in Northeastern Ohio and vicinity during the 1993 nesting season. 1,270 nests were surveyed for number of young fledged as a measure of breeding success. Also noted were: distance from perimeter nests to human foot traffic, the type of barrier surrounding each heronry (water, land, and/ or water, fence, none), and types of disturbances that occur near each heronry (foot traffic, mechanical, none). No relationship was found between nesting success in Great Blue Herons and distance alone, but a strong correlation was discovered between the number of young fledged and barrier type. Effectiveness of the barrier in isolating nesting herons is not a solely a function of distance, but rather the barrier’s ability to actually prevent intrusion. There is also evidence that mechanical disturbances in the vicinity of a heronry do not negatively affect nesting success.

4:30 IMPACTS OF SPECTACLED FLYING FOX GUANO AND LEAF STRIPPING ON SOIL FERTILITY AND RAINFOREST VEGETATION AT ROOST SITES. Christine A. McKenzie, DEPT. OF BIOLOGY, JOHN CARROLL UNIVERSITY, UNIVERSITY HEIGHTS OH 44118.

Two research sites were studied from 6 Nov 1993 - 2 Dec 1993 at the Atherton Tableland, N. Queensland, Australia to determine the impact of spectacled flying foxes, Pteropus conspicillatus, on soil and developing rain forest vegetation beneath individual colonies. Vegetation surveys were conducted at each site, beneath flying fox colonies and in uncolonized areas. Soil samples were taken from each quadrant, pH tested and used in sorghum growth experiments. On average, a greater number of seedlings< 10 cm high was growing beneath colonies than under unoccupied areas. Soil samples taken from colonized areas were shown to have a significantly low pH which has no significant effect on sorghum germination and growth in a controlled setting. Increased seedling germination beneath roost sites and sorghum growth experiments show that flying fox colonies do not appear to negatively impact seedling germination but factors determining seedling mortality in rain forest habitat have yet to be determined.
variations in process and reactor design of anaerobic treatment facilities. Examples include anaerobic contact reactors, fluidized beds, upflow anaerobic sludge blanket (UASB) reactors, baffled tanks, and several other reactor configurations. However, the role of mixing plays in each design variation has not been clearly established. Four laboratory-scale reactors were used to study the effects of mixing intensity and mixing duration on the anaerobic treatment of potato-processing wastewater at 20°C. It was found that both mixing intensities and mixing durations studied and their joint effect significantly affected the steady-state performance of the anaerobic reactors in treating the potato-processing wastewater with respect to organics and solids removals and methane production.

2:45 ANAEROBIC TREATMENT OF POTATO PROCESSING WASTEWATER. Suresh R. Karr and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115.

Potato processing wastewater is characteristically of high organic strength (BOD from 3,000 to 10,000 mg/L and SS from 1,500 to 5,000 mg/L), and has high levels of TOC (70 to 350 mg/L). The wastewater's organic strength makes it attractive to treat anaerobically. Consequently, there are several existing full-scale anaerobic pretreatment systems for potato-processing wastewater. The metabolic product methane may be used as a fuel source for conditions which favor the growth of the acid forming-hydrogenoclastic symbiotic organisms. No molecular oxygen needs to be provided, the quantity of cells produced is much less, with nutrient requirements reduced accordingly and may not need to be added. Loading rates can be high which permits processing of wastewaters having high organics providing toxicity is not limiting, the much slower growth rate from lower kinetic values requires larger holding equipment, and cell retention times must be longer, days instead of hours. This paper discusses different types of anaerobic treatment systems which encompass both high and low rate reactors and also discusses several case studies.

3:00 ANAEROBIC TREATMENT OF POTATO WASTEWATERS. Ramesh V. Yalamanchi and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115.

The use of anaerobic treatment as pretreatment before the aerobic treatment of the potato processing wastewater has become a common practice. The anaerobic treatment process is effective in the removal of 85% to 90% of the COD in the wastewater and reduces the stress on the aerobic treatment process. Although anaerobic pretreatment removes 85% to 95% of the raw wastewater COD and SS, nearly all of the nitrogen present in the raw wastewater remains in the anaerobic effluent and the conventional aerobic polishing of the aerobic effluent (either activated sludge or aeration basin) removes little of the nitrogen. During the relatively high nitrogen concentrations involved there may be negative impacts on the environment if these treated waste streams are released directly. Nitrogen can be biologically removed from wastewater in properly designed and operated systems such as A/O activated sludge, UCT, ICAS, oxidation ditches, fixed film reactors and The SBR. Among the above processes SBR processes is widely chosen, because of the single basin reaction clarification capability of the SBR.

3:15 PNEUMATIC FRACTURING EXTRACTION OF VOLATILE ORGANIC COMPOUNDS. Ramesh V. Yalamanchi and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115.

Pneumatic fracturing extraction is a process used to remove volatile organic compounds from the vadose zone, particularly where the ground formation is relatively impermeable to the airflow. This process involves injecting short bursts (<1 min) of compressed air (up to 500 psi) into the formation, causing the formation to fracture at weak points. This fracture will allow increased flow of air through the formation and in effect increases the permeability of the formation and the radius of influence for vapor extraction. The results suggest that PFE can make low permeable formations such as the bed rocks, shales and clay suitable for vapor extraction. It was found that PFE does increase extracted airflow rates by more than 600% and trichloroethene (TCE) mass removal rates by 67% and in one experiment methylene chloride (CH2Cl2) concentration was peaked at 6677 ppm after posttreatment mass removal was nearly 100% with peak concentration for prefracture was 25 ppm. The radius of influence of vapor extraction also was greatly enlarged by fracturing and thus reduced the number of monitoring wells required for vapor extraction.

3:30 EVALUATING PETROLEUM DEGRADING POTENTIAL OF MICROORGANISMS FROM WATER AND SEDIMENT. Manik Jha, Pritam Mehta, Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115, Ruth Yu-Li Yeh and Jack Kuei-Chang Shu, Ming Hsin Engineering College, Hsinchu, Taiwan.

Anaerobic microbial reactions in the marine water and sediment is a potential way of degrading the complex organic pollutants. Petroleum products are a major component of these organic pollutants. This paper examines the ability of the microorganisms in the sediments and the water to degrade the petroleum products. For the purpose of isolation supplemented with nitrate and phosphate was inoculated with river water and dilutions of the river sediment. The inoculated solutions were overlaid with sterile solid pollutant from the river. The solid pollutant was a chloroform extract from the river bed. Duplicate cultures and uninoculated controls were incubated for 28 days at 20°C to 22°C. Microbial growth and release of acidic products were monitored at weekly intervals. Extracts were used for identifying the sediments. Extracts were used for identifying the aluminas as stationary phase, to aromatic, resin, and asphaltene components. The percent and the component type of the petroleum product degraded over time were determined and graphed.

3:45 BIOLOGICAL TREATABILITY OF PHENOL AND METHANOL. Ramesh R. Wani and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115.

This paper describes the effects of temperature, pH, salinity, and nutrients on biological treatment of phenol and methanol with a statistical analysis. The substrate utilization rate coefficient (k) decreased as pH deviated from neutral and as salinity increased, and the unfavorable pH and salinity alleviated the temperature effect on k. The endogenous respiration activity was affected by various environmental factors such as pH, temperature, and salinity; however, the cell decay coefficient (kd) turned out to be correlated to a single parameter, k. In batch treatment of 770 mg/l phenol and 1000 mg/l methanol as TOC, nitrogen and phosphorus did not have any recognizable effect on k, while trace elements Fe, Mg, Mn, Cu, and Zn showed a slightly perceptible effect. The absence of extra-cellular nitrogen and phosphorus resulted in a greater cell yield; however, the cells in this condition decayed more rapidly than normal cell. The primary factor affecting the substrate decomposition rate in natural systems was pH. An initial lag phase was observed in 8 out of 11 phenol batch tests and 5 out of 6 methanol batch tests.

4:00 FACTORS AFFECTING BIODEGRADATION OF PHENOL IN SAND AND CLAY. Ganesh Balakrishna and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115.

The main objective of this work is to study the effect of various factors in the biodegradation of phenol in soils. Three types of samples used include pure sand, pure clay, and combination of the two in equal proportions. The factors investigated consist of soil to water ratio, the strength of the contaminant and the dosages and the types of LLMO (live liquid microorganisms) used in bioaugmentation. Five types of LLMO were used in this study. Nitrogen and phosphorus were added as nutrients. Samples were incubated in a shaker at 24°C for a period of 2 weeks and the initial and final TOC (total organic carbon) were determined. Performance of the various combinations of the above parameters in degrading the phenol contaminant was studied and compared.

4:15 REMOVAL OF ORGANIC POLLUTANTS BY PACT. Jae-Choon You and Yung-Tse Hung, Civil Engineering Dept., Howard H. Lo, Dept. of Geological Sciences, Ha-Che Howard Phu, Computer and Information Science Dept., Cleveland State University, Cleveland OH 44115.

Activated sludge process is widely used for treating industrial organic wastewater. Adequate management in operating the biotreatment system is necessary to maintain the desired performance efficiency. With the growth of industry and increased use of various chemicals in households, there is an increasing number of compounds that fail to respond to this treatment process. Since activated carbon is able to adsorb many organic compounds, powdered activated carbon has been used to treat wastewater of biological treatment plants. The purpose of this study is to elucidate the effect of powdered activated carbon (PAC) additions on performance of activated sludge (AS) process and factors affecting the efficiency of PACT, such as carbon concentration, sludge age, hydraulic detention time, two stage PACT, and temperature in treating wastewater. Further improvement in performance of biological treatment was studied using powdered activated carbon in the activated sludge process. The results indicate that it improves the process, probably by reducing the inhibitory action of the compounds.

4:30 OPTIMIZATION OF ACTIVATED SLUDGE SYSTEM BY BIOAUGMENTATION. Pheend Mehta and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115.

The activated sludge system is increasingly being used for the treatment of chemical process plant effluents. However, in many real plant situations, effluent treatment plants are subjected to a number of unfavorable operating conditions like high sludge production, shock loading, and poor settling characteristics. In these conditions, traditional optimization techniques are sometimes poor solutions to maintain high treatment efficiency. This paper describes the use of the bioaugmentation technique as a method to flexibly optimize an activated sludge system, used for the treatment of wastewater containing high concentrations of organic compounds. The augmented system is evaluated for the removal of BOD, COD, settling characteristics and also for the degradability of hazardous chemicals. The situations examined include transient loading of the system, varying organics concentration in the influent and varying parameters like pH and nutrients. Different methods for the application of bioaugmentation are studied and their effect on the treatment efficiency for the activated sludge system were examined.

4:45 MERCURY REMOVAL FROM MERCURY BEARING WASTEWATER. R. B. Mehta and Yung-Tse Hung, Civil Engineering Dept., Cleveland State University, Cleveland OH 44115.

Mercury pollution has always been a major environmental issue due to its toxicity and its ability to concentrate in aquatic life. This paper describes various methods for the treatment of mercury-bearing wastewaters. Liquid-liquid exchange method for mercury removal from water over a wide pH range has been described as have been other conventional method of mercury removal. HgCl2 can be removed from wastewater by ion exchange using chelate resin. A method for recovery of the mercury from the chelate resins by electrolytic desorption is briefly described. Newer technique like the extraction of mercury with sulfonated lipophilic oil and the use of modified montmorillonite bentonite for adsorption of mercury from water are also described.
Information, Computing, and Communications Division
COMPUTER SCIENCE: SYSTEMS, ARTIFICIAL INTELLIGENCE & MEDICAL APPLICATIONS, IMAGING
1:30 PM - Saturday, April 23, 1994
Health Education Room 110
Deborah L. Whitfield, Presiding


The paper evaluates Performance Growth of IBM personal computers since the introduction of IBM PC in 1981. Currently the highest performing 80X86 personal computer platform is IBM486DX-2-66MHz. A synthetic bench marked called Stony-7e was used to measure the performance of these computers. Throughout of X is twice higher than Y, where, is the percent difference in execution of X and Y is calculated as follows: X(100)-Y/2 = 100. Performance ratio, k=1.51 to 1.56. The IBM 80X86 personal computer platform performance increased an average of 52% per year. Assuming this rate of growth will continue, the performance of the 80X86 in the year 2000 can be predicted to be 2750% relative to IBM XT.

1:45 A METHOD TO OBTAIN OPERATING POINT INFORMATION FOR TERTIARY STORAGE SYSTEMS. GERALD H. HELMICK, DEPT. OF COMPUTER SCIENCE AND ENGINEERING, UNIVERSITY OF TOLEDO, 2801 WEST BANCROFT STREET, TOLEDO OH 43606.

The use of tertiary or near-line storage for files, only found on large computer systems in use at the national laboratories at one time, is becoming increasingly common on smaller computer systems. To determine the economic feasibility of such a system and the desired operational characteristics of a suitable storage device it is necessary to have information on the behavior of the files on the system. Previously, systems considered for addition of tertiary storage had reached a saturation point where the question was moot. Today, with the wide range of tertiary storage devices and their capabilities, determining if and when a system will benefit from tertiary storage is not as clear. A method utilizing sampling and multivariate analysis has been developed for and verified on existing file behavior data and will be presented. The results provide guidance on the specification and implementation of tertiary storage systems on computer systems with little information on previous file behavior. Results study will be presented along with observations of how the needed data may be gathered and analyzed.

2:00 OPTIMIZING COMPUTER PROGRAMS USING POWERFUL TECHNIQUES. DEBORAH L. WHITFIELD, DEPT. OF COMPUTER SCIENCE, SLIPPERY ROCK UNIVERSITY, SLIPPERY ROCK PA 16057.

Currently, interest in parallelizing optimizations is growing with the recognition of the necessity of performing optimizations to effectively utilize parallel architectures. To exploit parallel architectures, powerful optimizations must be applied at the most effective location in the program and in the most beneficial order. Few guidelines exist for determining when and where to apply optimizations to produce the most efficient code, the order of applying optimizations can have an impact on the efficiency of the final code. However, determining the appropriate optimizations is difficult due to the complex interactions among the optimizations, scheduler and architecture. The introduction of more powerful parallelizing optimizations that generate these powerful optimizers must be designed. To aid in selecting appropriate optimizations, an optimizer generator (Genesis) is presented that produces an optimizer from the range of tertiary storage devices and their capabilities, determining if and when a system will benefit from tertiary storage is not as clear. A method utilizing sampling and multivariate analysis has been developed for and verified on existing file behavior data and will be presented. The results provide guidance on the specification and implementation of tertiary storage systems on computer systems with little information on previous file behavior. Results study will be presented along with observations of how the needed data may be gathered and analyzed.

2:15 ROBOT DESIGN: FROM START TO FINISH. JOHN K. ESTELL, THOMAS A. OWEN, CRAIG A. SECCUBESLWISKI, COMPUTER SCIENCE AND ENGINEERING DEPT., UNIVERSITY OF TOLEDO, TOLEDO OH 43606.

An autonomous microprocessor-based controller, SCORPIO, was designed for operating a low-cost, multi-legged robotic system. SCORPIO is based upon the Stiquito hexapod robot developed at Indiana University. The main goal of the SCORPIO project was to provide a completely self-contained robotic system capable of interacting with its environment. Since the Stiquito’s load capacity was limited, a new body was developed to accommodate a controller, sensor array, and power supply. The controller, based on the 80C32 microprocessor, was provided with all necessary resources to allow the robot to be programmed. To accomplish this programming, a new pseudo-assembly language was developed. The SCORPIO Language Assembler is a general purpose robot controller language designed to aid in program development and for direct manipulation of the multiple IR emitter/detector pairs. These are designed for wave front detection, and allow for simple object avoidance. The basic controller design is flexible enough to be included in future robot designs with little or no modification to either hardware or software.

2:30 KNOWLEDGE SHARING BETWEEN EXPERT SYSTEMS. MARVIN L. DOW, COMPUTER SCIENCE & ENGINEERING DEPT., 2801 W. BANCROFT, UNIVERSITY OF TOLEDO, TOLEDO OH 43606-3390.

The current information age demands new approaches to the acquisition, transfer, interpretation, processing, and use of data. With the assistance of networks and of known data formats, it is now possible to access, copy, and move information back and forth between databases, spreadsheets, word processors, and/or computer programs. However, the sharing of knowledge between expert systems remains at the primitive level. This sharing of knowledge can take place either by sharing knowledge bases between expert systems, or by allowing systems to query each other for information. However, there are impediments to this sharing of knowledge: representations, dialects, lack of communication conventions, and lack of shared vocabulary and domain terminology. Although this paper covers each impediment and suggest mechanisms for handling the difficulties, the concentration is on mechanisms for solving the difficulty of sharing vocabulary and domain terminology.

2:45 VISUALIZATION OF AIR FLOW IN COMMERCIAL KITCHEN ENVIRONMENTS. WAYNE E. CARLSON, PETER CARMELLM, DAVID REED, LAWRENCE WADE, WEN SEUM, ADVANCED COMPUTING CENTER FOR THE ARTS AND DESIGN, OHIO STATE UNIVERSITY, 1224 KINNEAR RD., COLUMBUS OH 43212.

An interactive environment for designing and analyzing heat collection and dissipation in a commercial kitchen has been implemented. KitchenVIEW is used in the design of energy efficient kitchens, allowing a designer or architect to set up a virtual kitchen using a graphical interface. The designer or architect can visualize the airflow and other information that would occur in a real kitchen with that design. Using kitchenVIEW, many different kitchen setups can be tested to find one that optimizes efficiency, without the need to physically build and test them. KitchenVIEW is tailored for use with commercial kitchens, however, it could be used to visualize other environments. The user specifies a floor plan for the room, interactively positioning various appliances within the 3D space. After the initial design is completed, there are graphical tools for specifying a gross computational grid and related initial conditions, such as temperature, pressure, exhaust and inflow rates. These tools display a cross-section of the room including the appliance, which is used to specify a two-dimensional grid and the initial conditions at the grid points for that slice. The program then creates a 3-dimensional grid by connecting the 2-dimensional slices. This information is given to a separate computational fluid dynamics (CFD) program which refines the grid and computes the airflow, temperature and pressure at the grid points. KitchenVIEW is finally used to visualize the output of the CFD program (currently as a vector plot. Particle animations and contour plots are being added to the visualization.

3:00 SIMULATION OF VIRTUAL ENVIRONMENTS FOR USE IN WHEELCHAIR USER PROFICIENCY. WAYNE E. CARLSON, DONALD STREDNEY, EDWARD SWAIN, EDWARD SINDLAR, CYNTHIA HAYES, ADVANCED COMPUTING CENTER FOR THE ARTS AND DESIGN AND OHIO SUPERCOMPUTER CENTER, OHIO STATE UNIVERSITY, 1224 KINNEAR RD., COLUMBUS OH 43212.

This experimental project examines human performance in negotiating barrier free environments through the use of computer generated virtual simulations. Architectural plans of public and commercial buildings are entered into the system to provide a complete three dimensional environment in which the wheelchair user must navigate. A powered wheelchair is connected to a computer workstation, and the outputs of the operation controls are converted to commands to the graphics software. A resulting three dimensional view of the building is presented to the user via a stereo view image device. User performance data is collected and integrated by the training system to give feedback to the user, as well as to provide essential information regarding the design of these technologies. The project will be instrumental in defining standards for computer generated environments for more efficient selection of enabling technology for the disabled. In addition, this research will demonstrate direct implications to the development of enabling technology through virtual testing and analysis. The system developed for this project can be used by architects, developers, designers and builders to assure barrier free environments in order to assure unlimited access to these environments (public buildings, shopping malls, homes and offices, retail stores, etc.) by the disabled.

3:15 BIOMEDICAL SIMULATIONS OF HIGH PERFORMANCE COMPUTING. DON SITREYSEN, ROW VAGES, GREG WET, M.D., EDWARD SWAIN, FENDIS SHEEPERS, OHIO SUPERCOMPUTER CENTER, 1224 KINNEAR RD., COLUMBUS OH 43212-1163.

At the Ohio Supercomputer Center, and the College of Medicine and the Advanced Computing Center for the Arts and Design at The Ohio State University, a system is under
development to provide an intuitive interface for manipulating and experiencing virtual data sets, specifically volume reconstructions of multi-modal medical data. This design requires a minimum of setup time and user calibration. Initial user settings are stored on-line, and can be readily modified to accommodate user differences. Current research topics include the following: The Correlation of functional (EEG) and structural (MRI) images to investigate the pathophysiology associated with drug addiction (in collaboration with the Alcohol and Drug Abuse Research Center, Harvard Medical School). Rounding regional anesthesia, specifically the technique of the epidural block (in collaboration with the Department of Anesthesiology, The Ohio State University Hospitals). Visualizing and determining tumor morphology in patients with skullbase and intracranial tumors (in collaboration with the Department of Neurosurgery and Otolaryngology, The Ohio State University Hospitals, and The Arthur James Comprehensive Cancer Hospital and Research Institute).

3:30 REMOTE DIAGNOSIS USING VOLUME VISUALIZATION OF SATELLITE TRANSMITTED MEDICAL DATA. Wayne E. Carson, Rom Yagel, Stephen May, Stephen Spencer, Don Studzinski, Charles Bender, Advanced Computing Center for the Arts and Design and Ohio Supercomputer Center, Ohio State University, 1224 Kannear Rd., Columbus OH 43212.

An experiment is underway to provide tools and techniques for medical diagnosis in patients in a medically deprived remote area of Hawaii by utilizing the NASA ACTS satellite to transmit medical scanner image data for visualization and analysis by experts at a separate site. The first experiment is to transmit two dimensional images of an injured patient. These image data sets are then transmitted over the High Data Rate terminal to the ACTS satellite, and then to the Ohio Supercomputer Center where a parallel volume rendering algorithm is used to create a three dimensional visual representation of the data. These real-time images are broadcast back to the medical remote site for the attending physician to view and manipulate. In addition the images are simultaneously sent to Georgetown University for evaluation and analysis by a team of expert radiologists. Their resulting treatment plan is sent via the satellite with other collaboration information to the remote site so to be used in a medical triage situation. In addition to real-time parallel rendering, the experiment will allow for segmentation of these data sets, resulting in the ability of the physician to concentrate attention on certain tissues or organs that might be affected by the injury. The experimental rendering algorithms are also able to combine data from multiple modalities (eg, MRI and EEG data) in a single three dimensional rendering, providing an even greater opportunity for correct diagnosis and treatment planning.

3:45 MAP SCALE CHANGE, "RADICAL LAW" AND FRACTALS. Yu Zhou, Dept. of Geography, Bowling Green State University, Bowling Green OH 43403.

Scientists need to look at the world at a very wide range of spatial scales. This task frequently involves scale change—a traditional operation in cartography. Automation of map scale change, however, has many unsolved problems. Friedrich Töpel, a German cartographer, declared that the relationship between map scale and map information content can be expressed, fundamentally, as a "square root" function. His idea, although not examine to any further, expressed, fundamentally, as a "square root" function. His idea, although not examined to any further, suggests that the scale-information relationship is fractal in nature. Like the D-value (a parameter employed by fractal geometry as a measure for the character of a line or a surface), the p-value, a parameter derived from Töpel's equation, can be served as an indicator to describe the degree of information reduction caused by scale change. An important contribution to the problem of deriving a map at any required scale from a single large-scale database has, therefore, been made.

ERGONOMICS, COMPUTERS, and LIBRARY & INFORMATION SCIENCES

9:00 AM - Saturday, April 23, 1994 Health Education Room 110 Bruce A. Leach, Presiding

9:00 RANDOLPH GREENFIELD ADAMS OF THE WILLIAM L. CLEMENTS LIBRARY: SENTIMENTAL BOOKMAN-SCHOLAR. Robert A. Shaddy, Ward M. Canaday Center, Carlson Library, University of Toledo, Toledo OH 43606.

Randolph Greenfield Adams (1892-1951), historian and librarian, became the first director of the William L. Clements Library at the University of Michigan in 1923 and served there until his death. During his tenure he took up the cause of the rare-book collector and devoted himself to the preservation of rare books and other special collections thus opposing the major trend in American librarianship at that time of the priority of service to the reader. His numerous publications, addresses, and other works repeatedly stated that the care of rare materials should be put before the desires of readers and librarians. His most famous statement on this theme was the classic article "Librarians as Enemies of Books," which was published in 1937. His efforts contributed to the institution of services throughout the country which helped convince collectors that their collections would be cared for properly by librarians. By the middle of the twentieth century, more collections of rare materials were institutionalized by their owners (rather than being put up for auction) than at any other time in American history. This paper briefly explores Adams as a "custodian of culture" and his views regarding rare books librarianship.

9:15 IDENTIFYING CD-ROM USE PATTERNS AS A TOOL FOR EVALUATING USER INSTRUCTION. Bruce Leach, Biological Sciences Library, Ohio State University, 1735 Neil Ave., Columbus OH 43210.

All CD-ROM database use in the Biological Sciences Library is recorded on daily workstation "reservation" logs. Workstation logs from January 1987 through June 1991 were used to determine use patterns of individual database searches. Names of searchers and dates of use were entered into a WordPerfect file, then sorted. For each individual, the number of days on which databases were searched, the interval between first and last database use, and the number of academic quarters in which the user searched databases were calculated. 1501 individuals were identified. More than half of the observed CD-ROM searches recorded all database use within one month. Over one third recorded use on only one day. Results suggest that the library emphasize brief basic instruction for all first-time-searchers and de-emphasize workshops.

9:30 USING THE INNOVACQ LIST CREATION ABILITY TO OBTAIN LISTS OF PERIODICAL ARRIVALS. Dale Ebersole, J.R. Carlson Library, University of Toledo, Toledo OH 43606.

The list creation ability of the INNOVACQ system can be utilized to generate lists of arriving periodicals for interested faculty. At this institution a departmental identifier from the order record and the date of latest arrival from the check in record can be utilized to create such a list. Use of a definite time frame would allow only those titles that arrived since a specified beginning date to be listed. All issues that arrived during the past week, 2 weeks, month, etc. would be listed alphabetically by title with arriving issue identification. Some ways in which these lists could be utilized are mentioned. They will be constrained by equipment availability, cost, possible legal restrictions, and the availability of people to perform necessary input tasks.

9:45 ACCESSING ETHNIC INFORMATION SOURCES IN MIDWESTERN CULTURAL INSTITUTIONS. Lois J. Buttlar and Rainier Garcia, School of Library and Information Science, Kent State University, Kent OH 44242-0001.

Cultural pluralism in the United States is based on the appreciation of a rich variety of ethnic peoples—their traditions, arts, languages and histories. Changing demographics and the new immigration waves of the eighties and nineties have brought attention to various national groups. Unfortunately, librarians, scholars, and educators do not have access to the valuable resources in many of the ethnic institutions because their holdings are not analyzed by indexing and abstracting services. The proposed presentation is a description of the ethnic museums, archives, and libraries in the Midwest, including their collections, availability to the public, admission charges, programs, and services provided (guided tours, exhibits, lectures, loans, etc.).

10:00 MISCONCEPTIONS IN HUMAN FACTORS. Henry F. Ledgard, Ph.D., Computer Science and Engineering Dept., University of Toledo, Toledo OH 43606.

The field of computers has seen a rapid growth in graphical interface users and an ever widening set of users. Many, many people spend hours a day using a computer. Ease of use is a paramount issue. We hold that there are major misconceptions in the field. They are largely unspoken, and can reflect a set of established attitudes in our profession. Some of these misconceptions are: 1. The primary goal of human factors is to help novices; 2. Ease of learning implies ease of use; 3. Regular computer users do not really need human factors; 4. Most graphical interfaces are pretty easy to use; 5. Users should help design systems; 6. Human engineering centers on a few key issues; 7. Users will be comfortable with a design; 8. Human engineering is not particularly a technical matter; and 9. Human factors are chiefly a matter of taste. We need to make computers better for people. To do this we need to understand such misconceptions and make a serious attempt to improve the situation.

10:15 KNEELING, AN ALTERNATIVE TO SITTING. Henry F. Ledgard, Ph.D. and Berne V. Falk, M.A., Computer Science and Engineering Dept., University of Toledo, Toledo OH 43606.

Sitting is a major health hazard. Prolonged sitting induces general weakness, poor posture, poor walking habits, and lack of energy. Prolonged sitting is detrimental to one's health and well-being. Office work and the field of computers has resulted in a rapid increase in sitting. Many people spend hours a day sitting. I have been experimenting with using the computer kneeling down. It is wonderful. It takes time to develop the strength in the knees, legs, and feet in order to be able to kneel for periods of ten or twenty minutes. It hard at first. Frequent movement makes the situation much easier. The results are directly visible. One definitely feels better. We need to make office work better for people. To do this we need to take the sitting issue seriously and improve the situation. This work is based on and derived from the work of Berne V. Falk, M.A. of Grosse Pointe Park, Michigan.
The hypothesis of this work is that cross-dominance induces a high level of stress. This hypothesis, if true, has far reaching consequences. Every person has a dominant eye. The dominant eye in most people is the eye that the individual uses to sight with a camera. Almost every individual also has a dominant hand. This is the hand the individual uses in handwriting. We say that a person is "cross-dominant" if the dominant eye and dominant hand are on opposite sides. Bernie Falk estimates that one out of four or five persons is cross-dominant. We believe cross-dominance influences people in many serious ways. It is a major factor in psychological difficulties, learning disabilities, behavioral problems in children, coordination in sports, and general anxiety. Cross-dominant individuals can never really relax. They are always in a state of chronic stress. Quite remarkably, most cross-dominant people are not aware directly of their stress or the possible influence of their cross-dominance on their level of stress.

10:45 POSTER BREAK

Medical Sciences and Health Technologies Division

CARDIOLOGY - MEDICINE

1:30 PM - Saturday, April 23, 1994

Lucas Blair P. Grubb, Presiding

1:30 DETERMINATION OF AUTONOMIC ACTIVITY IN PATIENTS WITH NEURALLY MEDIATED SYNCOPE BY SPECTRAL ANALYSIS OF HEART RATE VARIABILITY. Blair Grubb, Daniel Kosinski, Danielle Samo, Rodger D. MacArthur, Happy Haan, Laura Elliott, Medical College of Ohio, PO Box 10008, Toledo OH 43699.

Heart rate variability (HRV) analysis measures R-R interval variability as a correlate of cardiac autonomic modulation. Power spectral analysis (PSA) of HRV is an analysis of R-R intervals using fast Fourier transformation represented as a frequency distribution with discreet sympathetic (low 0.04 - 0.15 Hz) and parasympathetic (high 0.15 - 0.40 Hz) frequency components. We analyzed HRV by PSA in 57 pts. undergoing head upright tilt testing (HUTT). Analysis was performed during a supine 6 min. interval immediately prior to HUTT, and a 6 min. interval immediately after elevation to an 80 degree tilt angle. Patients were analyzed during their initial HUTT, in which all were positive, and on repeat testing during medical therapy. On repeat testing all patients were negative. The analysis was to determine if conversion to a negative test was due to an alteration in basal autonomic tone as measured by supine analysis and immediate response to orthostatic stress. Results are expressed as a ratio of low/high frequency power.

One way analysis of variance with repeated measures found a significant difference between the groups.

1:45 COMPARISON OF AUTONOMIC MODULATION IN SUBGROUPS OF PATIENTS WITH NEURALLY MEDIATED SYNCOPE UTILIZING SPECTRAL ANALYSIS OF HEART RATE VARIABILITY. Blair Grubb, Danielle Samo, Daniel Kosinski, Rodger D. MacArthur, Laura Elliott, Happy Haan, Medical College of Ohio, PO Box 10008, Toledo OH 43699.

Head upright tilt testing (HUTT) is used to diagnose neurocardiogenic syncope. Three basic response patterns to HUTT have been identified: a cardioinhibitory, a vasodepressor, and a mixed response in which both features are prominent. Power spectral analysis (PSA) of heart rate variability (HRV) is a fast Fourier transformation analysis of R-R intervals represented as a frequency distribution with discreet sympathetic (low 0.04 - 0.15 Hz) and parasympathetic (high 0.15 - 0.40 Hz) frequency peaks. We studied 32 pts. with syncope during HUTT. PSA was performed during a supine 6 min. interval prior to HUTT and a 6 min. interval immediately after elevation to an 80 degree angle. Analysis was performed to determine if differences existed between the sub-groups in terms of baseline autonomic tone or response to HUTT. Initial results are expressed in a ratio of high/low power which reflects sympathetic activity.

2:15 THE USE OF SEROTONIN RE-UPTAKE INHIBITORS FOR THE TREATMENT OF RECURRENT SYNCOPE DUE TO CARDIOT SINUS HYPERSENSITIVITY UNRESPONSIVE TO DUAL CHAMBER PACING. Blair P. Grubb, M.D., Daniel Kosinski, M.D., Danielle Samo, M.D., Peter Temestarios, M.D., Medical College of Ohio, PO Box 10008, Toledo OH 43699.

Cardiac sinus hypersensitivity (CSH) may be a cause of syncope in older patients (pts). Dual chamber pacing may relieve the bradycardia, but not the vasovagal component of this disorder. Serotonin may play an important role in mediating this disorder. Three pts with CSH who had recurrent syncope after dual chamber pacing due to excessive vasodilatation were placed on serotonin reuptake inhibitors (either fluoxetine 20 mg/d or sertraline 50 mg/d). After 46 weeks, all three have experienced resolution of symptoms. In addition, carotid sinus massage failed to provoke syncope in each. We conclude that serotonin reuptake inhibitors may be useful in the therapy of CSH resistant to dual chamber pacing.

2:30 THE USE OF SERTRALINE HYDROCHLORIDE IN THE TREATMENT OF REFRACTORY NEUROCARDIOGENIC SYNCOPE IN CHILDREN AND ADOLESCENTS. Blair Grubb, Danielle Samo, Daniel Kosinski, Katrinka KP, Medical College of Ohio, PO Box 10008, Toledo OH 43699.

The purpose of our study was to determine if the serotonin reuptake inhibitor, sertraline, could prevent neurocardiogenic syncope in children and adolescents resistant to, or intolerant of other therapies. The serotonin reuptake inhibitor, fluoxetine hydrochloride, has been reported effective in preventing neurocardiogenic syncope in older adults. Seventeen young patients (pts) (mean age 15 yrs, range 10 - 18 yrs, 7 male, 10 female) with recurrent syncope and a positive head upright tilt table test were referred for study in whom standard therapies (fludrocortisone, transdermal scop-o-lamine, beta blockers, disopyramide) were ineffectual, poorly tolerated, or contraindicated. Sertraline hydrochloride was administered at 50 mg qd for 56 weeks. Head upright tilt table test was then re-performed as previously and the clinical effect was noted. Three pts. (18%) were intolerant of the drug and it was discontinued. Nine pts. became asymptomatic and tilt negative (52%), while 5 remained tilt positive (29%). Over a mean follow up period of 12+5 months, the tilt negative pts. remained symptom free while taking sertraline. The serotonin reuptake inhibitor sertraline hydrochloride is effective in preventing recurrent neurocardiogenic syncope in selected young pts. unresponsive to, or intolerant of other therapeutic modalities.

2:45 PREVENTION OF UPRIGHT TILT-INDUCED SYNCOPE WITH NIMODIPINE: EVIDENCE FOR A CEREBROVASCULAR MECHANISM? Danielle Samo, Blair P. Grubb, Gary Gerard, Daniel Kosinski, Happy Haan, Laura Elliott, Medical College of Ohio, PO Box 10008, Toledo OH 43699.

In order to evaluate the potential role of the cerebrovasculature in the pathophysiology of vasovagal syncope, we observed the effects of nimodipine, a cerebral artery vasodilator, on upright tilt-induced syncope. Five patients with recurrent syncope (3 men and 2 women, mean age 34 +/- 16 years) who had upright tilt-induced hypotension/bradycardia with concurrent cerebral arterial vasodilatation on transcranial Doppler ultrasonography (TCD) were treated with oral nimodipine, 30 mg every four hours for three days. Repeat tilt table testing and TCD
were then performed under the same conditions as the initial tilt. Syncope was prevented in 4 of 5 patients (80%) during the repeat study, and TCD showed no evidence of cerebral vasospasm. This suggests that cerebral arterial vasospasm may play an important role in the production of vaso-vagal syncope, and that oral nimodipine may be useful in patients resistant to other forms of pharmacotherapy.

3:00 HEART RATE VARIATION AND UPRIGHT TILT TESTING AS INDICATORS OF INAPPARENT AUTONOMIC DYSFUNCTION IN PATIENTS WITH ADVANCED HIV INFECTION. Daniela Samol, Rodger MacArthur, *Blair Grubb, Lynn Lipton, Laura Elliott, Henry Hahn, Medical College of Ohio, PO Box 10008, Toledo OH 43699.

We performed head upright tilting and concomitant heart rate variability analysis (fast Fourier transform) on HIV-infected males (mean CD4 count = 317/µL) and on uninfected age-matched controls (mean age = 35 years). Tibialis anterior electromyographic activity was monitored with respect to the development of clinical symptoms. The rate of tilt-induced syncope (2%) did not differ between infected and uninfected subjects. Infected fantets developed symptoms sooner than did uninfected fantets (8 minutes vs. 21 minutes, p < 0.10). Among infected subjects, syncope was more frequent in those with CD4 < 200/µL and smoking history, compared to non-smokers. Forty-two patients (56% vs. 12%, p = 0.05). Compared to controls, HIV-infected subjects demonstrated a relative resting tachycardia, and a relative inappropriate heart rate response to tilt, associated with a systolic blood pressure drop. The low-frequency amplitudes of resting heart rate variability in HIV-infected persons were significantly correlated with CD4 counts, with the lowest values associated with the lowest counts (r = 0.861, p < 0.001). We conclude that persons with advanced HIV infection have a high rate of autonomic dysfunction and abnormal heart rate variability patterns.

3:15 A COOPERATIVE NEEDS ASSESSMENT STUDY TO IDENTIFY HIV PREVENTION STRATEGIES. Judy L. Adams, Glen Sheldons, Dan Rent, Ben Walter, Dept. of Medical Technology, 504 Life Science Building, Bowling Green State University, Bowling Green OH 43403.

Identification of HIV prevention needs and strategies associated with various populations and agencies in a Northwest Ohio metropolitan area was made by joint effort between a county health department and a university's faculty. Different survey instruments for 10 target populations were developed and distributed to over 30 community groups. Populations included in the study represented the criminal justice system, Latino and African-American groups, schools, youth at risk, gay/bisexual persons, substance users, HIV positive individuals and persons with AIDS, clergy, elected officials, employers, physicians, service agencies, women in the workplace, and the elderly. Data were analyzed using frequency and percentages, as well as determination of significance for comparisons. Not unexpectedly, data indicate a reasonable amount of agreement if knowledge without personal application.

3:30 PREDICTION OF BLOOD PRESSURE RESPONSE OF INDIVIDUALS WITH ESSENTIAL HYPERTENSION TO STRESS MANAGEMENT THERAPY. Robert C. Span, Jr., M.Ed., LPC and Angelie McGrady, Ph.D., Medical College of Ohio, PO Box 10008, Toledo OH 43699-0008.

Stress management therapy has been shown to benefit individuals with high blood pressure (BP). Decreases in SP are observed in more than half of stage 1 (mild) and stage 2 (moderate) hypertensive persons, after 12 treatments of relaxation and home practice. Since therapy requires a significant time commitment, it is important to determine characteristics of patients that predict success or failure. Seventy-four patients, 24 males, 46 females, 19 blacks and 51 whites, were provided with group stress management therapy consisting mainly of relaxation and biofeedback treatments. Patients were asked to lower BP and 24-hour BP levels. Nineteen percent of patients were successful in lowering mean arterial pressure by at least 5 mm Hg. Multiple regression analysis was conducted to develop the prediction equation. Factors analyzed reflected the level of physiological arousal, in particular the activity of the sympathetic nervous system, thought to be involved in mild to moderate hypertension. Predictor factors included age, gender, systolic blood pressure, and diastolic blood pressure. BP levels had significant differences among racial groups, with blacks having higher BP levels than whites. Development and use of predictor models is cost and time effective and applicable to recommending treatment to patients with essential hypertension.

3:45 IMPRIEMPLA PLASMA CONCENTRATIONS AND RESPONSE IN PANIC DISORDER. Matig R. Mayissakalian & James M. Perel, Ohio State University, College of Medicine, Columbus OH 43210.

Plasma concentrations of imipramine (IM) and doxepin were assayed in 48 panic disorder with agoraphobia patients who completed an 8-week randomized double blind dose ranging study with imipramine hydrochloride: low dose (0.5 mg/kg/day, n = 17) medium dose (1.5 mg/kg/day, n = 17) and high dose (3 mg/kg/day, n = 14). Assessments included patient and clinician rated symptom scales of panic and phobias, as well as operationalized criteria of response, which were based on a 50% change from baseline to signify marked improvement or an absolute cutoff score to signify minimal to absent symptoms. Analysis included correlational and dose-response statistics with total, IM and DMI concentrations as well as multiple linear regression and logistic regression analysis with total, IM and DMI levels as predictors of symptom severity and response. Results revealed a sigmoidal/linear relationship between total plasma levels and response in panic and a curvilinear relationship between total plasma level and response in phobias (such that maximal response was achieved in the 75-133 ng/mL range, with diminished responses below and above this range). The curvilinearity of phobic response was associated with the highest concentrations of DMI while the IM- response curve remained linear or sigmoidal. The results have practical implications as they suggest separate and different mechanisms for imipramine’s anxiolytic and antihypertensive effects.

4:00 RENAL ARTERY STENOSIS PRESENTING AS ANGINA TREATED BY RENAL ARTERY STENTING. Gary Ansel, M.D., Sanjeev Pun, M.D., Medical College of Ohio, PO Box 10008, Toledo OH 43699-0008.

Renal artery stenosis is a common but frequently overlooked cause of reversible hypertension. We present a patient where renal artery stenosis presented as unexplained angina. A 52 year old white female presented with daily angina attacks, hypertension, and a history of frequent hospitalization. Coronary angiography showed diffuse non critical atherosclerosis of a small right coronary artery. Occluded circumflex and the left anterior descending were diffusely narrowed with a diagonal branch that was small with a 50% stenosis. These lesions were not amenable to coronary bypass grafting. A renal angiogram was done which revealed left renal artery stenosis with 70% narrowing and 50 mm Hg gradient. Renal artery angioplasty resolved with stent placement was done; patient's anginal symptoms and hypertension improved markedly. This patient provides important insight into the recognition of the role of renal artery stenosis in the manifestations of coronary artery disease. Renal artery disease is associated with persistent high renin and angiotensin levels. Angiotensin exerts a direct coronary vasoconstrictor effect on the large epicardial vessels and small resistance vessels. Relief of renal artery stenosis would decrease these angiotensin levels, thus increasing the coronary flow. With improved nonsurgical techniques such as vascular stent placement, clinicians need to be aware of renal artery stenosis manifesting as angina.

4:15 ACUTE INDUCIBLE PORPHYRIA: ANESTHETIC PROTOCOL FOR CORONARY ARTERY GRAFTING. Martha Kiemen-Benhamann and Michael R. Lust, Research Dept., St. Vincent Medical Center, Toledo OH 43608, J. Robert Sheid, Dept. of Anesthesiology, University of Michigan, Ann Arbor MI, Joseph Helpin, Dept. of Internal Medicine, Providence Hospital, Southfield MI.

The acute hepatic porphyrias are a group of pharmacogenetic disorders of heme metabolism. Patients who are carriers of acute porphyrias are placed at risk by general anesthesia because some induction agents may cause episodes of abdominal pain, neuropathy, or even fatal respiratory paralysis, in the present study, eight family members were examined. The patient is one of five found to be a Vagetae Porphyria carrier and he had coronary artery grafting. The patient was given sufentanil, atropine, and isoflurane. The course of anesthesia was uneventful; he made a full post-operative recovery and remained free of porphyria-related symptoms during subsequent months. There is no evidence that the use of sufentanil, atropine, and isoflurane either precipitates an attack of porphyria or harms nerve tissue in humans. The anesthetic protocol described here may be an acceptable drug combination for carriers of other inducible porphyrias undergoing heart surgery. (Supported in part by a grant from the F.M. Douglas Foundation).

4:30 COPROPORPHYRINON III (COPRO/G'EN) OXIDASE: A SIMPLIFIED ASSAY FOR THE DETECTION OF COPROPORPHYRIA. Martha Kiemen-Benhamann and Michael R. Lust, Research Dept., St. Vincent Medical Center, 2213 Cherry St., Toledo OH 43608, J. Maria Tomio Universidad de Buenos Aires, Dept. of Biological Chemistry, Buenos Aires 1428, Argentina.

Copro/g'en III oxidase catalyzes the conversion of copro/g'en III to p-tropolone (Pr0). In carriers of coproporphiria, enzyme activity is approximately half that of normal persons. The assay involves harvesting lymphocytes with Histopaque and Accupaque tubes. Lyphocytes are sequentially washed with phosphate buffered saline and centrifuged, resuspended in a TRIS buffer and incubated with copro/g'en III. A dilute HCl solution is used both to stop the reaction and to extract the Pr0, which is run in a gradient HPLC system. The mean +/- S.D. activity of controls was 269 +/- 61 pmoles Pr0/hour/mg protein (n = 19). Detection of carriers in a family with coproporphiria has been attempted with this assay. The assay conditions make this method simpler and quicker than previous procedures, but it is more specific. A case of Pr0ussia extracts, following by quantitation of the reaction products as porporhyrin esters. (Supported in part by the American Porphyria Foundation and the F. M. Douglas Foundation).

4:45 KANPO MEDICINE IN JAPAN. T. Neal Garland, Dept. of Sociology, University of Akron, Akron OH 44325.

Kanpo medicine, based on traditional Chinese medicine, has a long history in Japan. The national government tried twice to eradicate it—once in the late 1800s after the Meiji Restoration and once in the 1940s after the Pacific War. However, Kanpo has survived because it is deeply rooted in Japanese culture. The basic assumptions about causes of disease and the treatments utilized are quite different from those of Western medicine. A brief description of these assumptions and treatments is presented in this paper.

ENDOCRINOLOGY - BIOCHEMISTRY
9:00 AM - Saturday, April 23, 1994
LeeA. Merve, Presiding

9:00 INFLUENCE OF PRESH/AND/OF-PO-PRE-WEANING POLYCHLORINATED BIPHENYL (PCB) ON THYROID STATUS, BOD

9:30 THERMAL DEPENDENCE OF CO STORES IN REPTILES. MICHAEL GROUERC AND JENNY STI""
ANALYZING THE EXPRESSION OF HUMAN MHC CLASS II MOLECULES IN TRANSGENIC MICE. Michelle P. Pigott, Suzanne Mahon, Simon K Lawrence, Dept. of Life and Earth Sciences, Otterbein College, Westerville OH 43081-2006.

Tolerance, the ability to distinguish self from non-self in the immune system, is characterized primarily regulated by the thymus, being studied in transgenic mice which express human class II major histocompatibility complex (MHC) genes. MHC molecules are a group of polymorphic proteins necessary for antigen presentation to T cells, which subsequently provide immunity to foreign invaders. T cells are not self-reactive. MHC class II molecules are classified as heterodimers consisting of α and β chains. Mice of the B10.M strain possess mutations in both the α and β chains of the endogenous I-E MHC genes. Human forms of MHC class II genes, DRα and DRβ, have been added to these B10.M mice to determine if normal function is restored. Here, we report analysis of expression of the DRα and DRβ transgenes by two different methods. A histological analysis uses antibodies and staining techniques to search for protein products of histocompatibility genes in various tissues; the thymus, lymph nodes, and spleen have been examined. RNA analysis is performed by extracting RNA from various tissues, using gel electrophoresis to separate the RNAs, transferring the RNA to a nitrocellulose filter paper by northern blotting methods, and hybridizing the RNA with a known histocompatibility probe to show to what extent and in what tissues the RNA is present.

INFECTION OF MAC-1 EXPRESSING LEUKOCYTES IN MOUSE SKIN DURING MULTISTAGE CARCINOGENESIS. Gaetan N. Blute, Friederik M. Robertson, Dept. of Medical Microbiology and Immunology, Ohio State University, 410 West 12th Ave., Columbus OH 43210.

Mac-1(CD11b) is an integrin expressed on monocytes and neutrophils. It is a heterodimeric glycoprotein with a unique α subunit and β subunit common to both LFA-1 and p100,96. It functions as a receptor for the IC3b protein of complement and in cell-cell adhesion. The purpose of this study was to investigate Mac-1 expression by immunohistochemistry on mouse skin treated topically with 10ug of TPA (12-0-tetradecanoylphorbol-13-acetate) or a single application of 2ug TPA for 22 weeks to induce the formation of skin papillomas. Skin and peripheral lymph nodes (PLN) were isolated at 4h, 24h, 48h, 72h, 96h after a single treatment of TPA and a second treatment of TPA 24h prior to sacrifice at 96h. Skin papilloma and lymph nodes were isolated at 22 weeks. Mac-1 expressing leukocytes infiltrated into the dermis as early as 4h and remained localized to this site at 48h. At 96h Mac-1 positive leukocytes were predominantly in the lower dermis. There were Mac-1 positive leukocytes in both papillomas and PLN isolated from mice at 22 weeks after DMBA treatment. These results suggest that there is infiltration of Mac-1 expressing leukocytes during tumor promotion and that the appearance of Mac-1 expressing leukocytes to the lymph nodes. Mac-1 expressing leukocytes are also prevalent within skin papillomas and may contribute in part to the formation and continued growth of these tumors.

QUALIFICATION OF NORMAL AND INDUCED ANGIOSIS IN THE CHICK CHORIOALLANTOIC MEMBRANE. Loren M. Kerchner (1), Ronald L. Salsbury (1) and Steven P. Schmidt (2), (1) Dept. of Biology, University of Akron, Akron OH 44325-3908, and (2) Dept. of Surgery, Vascular Research Lab and Division of Surgical Research, Akron City Hospital, Akron OH 44309.

Angiogenesis, the development of new blood vessels, is of importance in the progressive growth of tumors, metastasis, and wound healing. To study and evaluate the potential of a substance, e.g. growth factors, tumor tissue, cartilage extracts, to induce or block angiogenesis, angiogenesis assays are commonly used. Several angiogenesis based on chick chorioallantoic membrane (CAM) assay is the most widely used. This assay has many benefits in terms of low costs, ease of use and reduced ethical concerns, but to date has not been objectively quantifiable using visual methods. We studied the normal CAM using the shellless and windowed chicken eggs, with and without tumor and control tissue grafts, and propose a method of quantification based on fractal geometrical principles. Using the box-counting method to determine the fractal (or similarity) dimension, Df, we have shown that the normally developing CAM has a Df of ca. 1.07 (day 4) and increases to ca. 1.60 (day 8-9). Tumor and graft induced angiogenesis shifts the Df local to the graft in a way that may be used as a humoral factor to the level of vascular growth. We conclude that this provides a unique, readily obtainable index of the angiogenic response that may be applied to other angiogenesis assays.

LABELED ANTIBODIES, NOT ALWAYS THAT SPECIFIC. Daniel W. Reed, David L. Mason, Miguel A. Pedraza, and John P. Borelli, Biology Dept., Wittenberg University, Springfield OH 45501.

The objective of the following study was to determine if testosterone (T) or dihydrotestosterone (DHT) replacement therapy increased blood pressure (bp) in castrated male and testicular feminized male (Tfm) rat hybrids. Along with bp measurements blood was used (n=80 total); Wistar Kyoto normotensive (WKY), hybrid back cross with a Y chromosome from a hypertensive father (SHR) and hybrid back cross with a Y chromosome from a normotensive father (SHR/a). Each cage had a 4 water bottle preference using 0, 0.5, 1, 1.5, 2% NaCl solutions. Females of all strains had about 100% greater Na appetite than males (p<.001), intruder stress increased Na appetite more in males than females (p<.01). Castrates (sympathetic blockade) decreased Na appetite in the hypertensive strains but not WKY but preference for the 0.5% Na did not change. There was a hypertensive Y chromosome effect with SHRs having 100% higher baseline Na appetite as compared to WKY males (p<.01). In conclusion, the higher Na appetite in females is partially mediated through the SNS in hypertensive strains but not WKY and the hypertensive Y chromosome is partially responsible for the increased Na appetite in SHR and SHRs as compared to WKY. 2:00 SODIUM APPETITE IS MEDIATED BY SYMPATHETIC OUTFLOW AND THE Y CHROMOSOME. Lawrence Ely, Michael Hermann, Linda Barrett, Monte Turner, and Daniel Ely, Dept. of Biology, University of Akron, Akron OH 44325-3908.

Our laboratory investigated the effects of stress upon sodium (Na) appetite and the influence of the Y chromosome on hypertension. The objectives of the following studies were to determine if female rats from several strains have higher Na appetite than males. 2) If the sympathetic nervous system (SNS) mediates this effect, and 3) If the Y chromosome from a hypertensive father increased Na appetite. Four rat strains (n=10/group) of both sexes were used (n=80 total); Wistar Kyoto normotensive (WKY), hybrid back cross with a Y chromosome from a hypertensive father (SHR), hybrid back cross with a Y chromosome from a normotensive father (SHR/a). Each cage had a 4 water bottle preference using 0, 0.5, 1, 1.5, 2% NaCl solutions. Females of all strains had about 100% greater Na appetite than males (p<.001), intruder stress increased Na appetite more in males than females (p<.01). Castrates (sympathetic blockade) decreased Na appetite in the hypertensive strains but not WKY but preference for the 0.5% Na did not change. There was a hypertensive Y chromosome effect with SHRs having 100% higher baseline Na appetite as compared to WKY males (p<.01). In conclusion, the higher Na appetite in females is partially mediated through the SNS in hypertensive strains but not WKY and the hypertensive Y chromosome is partially responsible for the increased Na appetite in SHR and SHRs as compared to WKY.


Our laboratory has shown that the rat Y chromosome from a spontaneously hypertensive (SHR) father leads to an increase in blood pressure (bp) not seen with the Y chromosome from a normotensive father. We have observed a bp difference at 6 weeks of age, but have not had the technique in place to test this difference earlier. We have determined the age at which bp differences between strains are significant we developed a technique to measure systolic bp using tail cuff sphygmomanometry in the 14 day-old rat. BP was measured in four groups (n=6 group) of male rats (SHR, WKY, SHR/a, SHR/Y). The SHR has the autosomes of the SHR, the Y chromosome of the SHR, and the Y chromosome of the SHR/a. Pressures and body weights were taken at 14, 18, 21, 28, and 35 days of age. SHR/a males had significantly higher bp than that of the SHR or WKY (p<.05). Preliminary data indicates that the SHR/a had higher bp than WKY, but similar to SHR. In conclusion, the hypertensive Y chromosome produced an early and substantial rise in systolic bp.
collected for catecholamine, DHT, and T analysis. The hybrid strain was created by crossing spontaneously hypertensive male rats (SHR) with testicular feminized male (Tfm) carrier normotensive King-Holzman females. The Tfm rats lack a functioning androgen receptor. Rats were castrated at week 4 and given plastic implants of either T, DHT, or sham. BP was recorded from week 5-15 by the tail cuff technique. Blood was taken at starting at week 8, then every three weeks. After 15 weeks rats were terminated and hearts, kidneys, adrenals, pituitaries, and brains collected. After 15 weeks BP was 158 mmHg for the male castrated rats with T implants, which was similar to controls. The male sham implanted rats were 147 mmHg. The male DHT implanted rats were 132 mmHg and the Tfm rats were 157 mmHg. In conclusion, T but not DHT restored BP in castrated hybrids and a functional androgen receptor was necessary.

2:30 EFFECTS OF 5A-DIHYDROTESTOSTERONE ON BLOOD PRESSURE IN THE CASTRATED SHR/TFM HYBRID RAT. Quin O. Zhao, Ronald L. Salisbury, Daniel Ely, Dept. of Biology, University of Akron, Akron OH 44325-3908.

This study examined the role of the androgen receptor on the development of hypertension in a hybrid rat model. Spontaneously hypertensive rats (SHR) were crossbred with normotensive strains, carrying the gene for testicular feminization (Tfm). The hybrid offspring were all hypertensive. The hybrid Tfm male lacks an androgen receptor, but its sibling brother has normal receptors. Both groups were castrated at 4 weeks of age. 5a-dihydrotestosterone (DHT) was implanted at 6 weeks of age and weekly blood pressures were recorded for 8 weeks. All data were analyzed by a two-way ANOVA (treatment x phenotype) and the results showed a significant main effect of treatment (p<0.05). At no time was there a significant difference in blood pressure between the Tfm and its control. However, significant differences were observed between the male sibling receiving DHT and its control during the early weeks of the experiment. We, therefore, conclude that the androgen receptor did have a role in the development of hypertension in this animal model.

2:45 THE INTERACTION OF TESTOSTERONE, NORPINEPHRINE AND THE Y CHROMOSOME UPON BLOOD PRESSURE IN HYPERTENSIVE AND NORMOTENSIVE RAT STRAINS. Denise Goray, Dan Dumpy, Dean Petricec, Lawrence Ely, and Daniel Ely, Dept. of Biology, University of Akron, Akron OH 44325-3908.

The objective was to determine if the sympathetic nervous system also interacted with the Y chromosome and androgen. Four strains of rats were utilized: 1) WKY, a normotensive strain, 2) SHR, a spontaneously hypertensive strain, 3) SHR/a, a strain possessing hypertensive autosomal genes with a normotensive Y chromosome, and 4) SHR/y, a strain possessing normotensive autosomal genes with a hypertensive Y chromosome. Rat pups from each of the four strains were examined: 1) normotensive, 2) SHR, 3) SHR/a, 4) SHR/y. All pups were castrated at birth to eliminate the androgen receptor blocker and, 2) clonidine/naloxone, an androgen receptor blocker, and 3) clonidine/naloxone and flutamide. Blood pressure (BP) was measured weekly between 5 and 22 weeks of age. Blood samples were collected and the serum was analyzed for noradrenaline and testosterone. In the clonidine group during stress, BP was higher in the SHR (150 mmHg) compared to SHR/a (151) when compared to SHR/y (142 mmHg) and SHR A (152) which renders the SHR and SHR/a similar and the SHR/y and WKY similar. In the clonidine/flutamide group were similarly reduced in all strains due to the blockade of both hypertensive components. In conclusion, the above results suggest that the interaction of the Y chromosome and androgens to produce an increased resting and stress induced rise in BP.

3:00 THE POST-NATAL EFFECTS OF 1,4,6 ANDROSTATREIN-3,17 DIONE (ATD) ON HYPERTENSION IN THE SPONTANEOUSLY HYPERTENSIVE MALE RAT (SHR). Dexter L. Lee, Ronald L. Salisbury, Daniel Ely, Dept. of Biology, University of Akron, Akron OH 44325-3908.

The objective of this study was to determine the effect of blocking estrogen formation during the first postnatal week of life on the development of hypertension in a hybrid spontaneously hypertensive male rat (SHR). Estrogen formation (aromatization) plays a key role in the mechanism of androgen induced sexual differentiation of the central nervous system at this time (Nafninn et al., 1976; MacLusky & Nafninn, 1981). Thus we sought to determine whether brain sexual differentiation was responsible for the sex difference in blood pressure observed in this strain. Male pups were obtained from a cross of female King-Holzman rats with male SHR. They were implanted with the aromatase inhibitor, 1,4,6 Androstatrien-3,17 Dione (ATD) on the third postnatal day of life. Blood pressures were measured weekly from postnatal days 35 to 84 and the data analyzed by one-way ANCOVA. At week 12 the average blood pressures were 163 +/-3 mmHg in ATD treated groups, respectively. We conclude the blocking rate of estrogen formation during the first postnatal week of life did not affect the development of hypertension in the hybrid SHR male.

3:15 CIRCADIAN BLOOD PRESSURE VARIABILITY IS ENHANCED BY SOCIAL INTERACTION USING TELEMETRY. Ann Coplea, Dane Dumpy, Daniel Ely, Dept. of Biology, University of Akron, Akron OH 44325-3908.

It is generally accepted that blood pressure (BP) fluctuates over a 24 hr period. In humans it has been suggested that internal regulation and activity are responsible for the 24 hr BP variability. Therefore, the purpose of this experiment was to determine in rats: 1) if 24 hr BP in individually caged and socially interacting colony housing were different, 2) if there was a Y chromosome hypertensive effect. Two substrains, SHR-y and SHR-a, were compared to WKY and SHR. All rats were on a high sodium (3%) diet for the duration of the experiment. Continuous BP was monitored using aortic radio-telemetry (Data Science). All strains showed a significant BP increase (p<0.01) during the dark cycle versus the light cycle except for the caged WKY strain. However, the colony rats of all strains had greater dark cycle BP increases than strain-matched caged animals. Overall, caged animals spent at least 68% of the 24 hr period with pressures >150 mmHg, whereas colony rats' pressures increased considerably. SHR colony rats spent 27% of their time at a BP >166 mmHg and SHR-y caged spent 6% of their time at a BP >166 mmHg as compared to WKY colony rats spent 10% of their time >166 mmHg and WKY caged spent only 1% >166 mmHg. In conclusion, although circadian patterns may be internally regulated, the extent of BP variability is enhanced by social interaction, and the Y chromosome increased BP in normotensive rats in colony and caged conditions.

3:30 CROSS FOSTERING HYPERTENSIVE RATS ALTERS BLOOD PRESSURE. Tonous Salim, Linda Barrett, Monte Turner, Ronald Salisbury, and Daniel Ely, Dept. of Biology, University of Akron, Akron OH 44325-3908.

The objective of this study was to determine the mechanism by which blood pressure (BP) of hypertensive pups is reduced by cross-fostering to a normotensive mother. This study used two new substrains of rats. The SHR/y has 99% SHR autosomal genes and a WKY Y chromosome, and the SHR/a has 99% WKY autosomal genes and a SHR Y chromosome. Two sets of three WKY females were placed in breeding cages with one SHR/y male. Also, two sets of three SHR/a females were placed in a cage with one SHR/a male. When the mothers delivered, the number of pups and sex was recorded, and at that time a lactating WKY or SHR foster mother was put in her place. Body weights were taken, weekly and beginning at two weeks, BP was taken weekly, utilizing the tail cuff method. At 6 and 10 weeks, blood samples were taken using retroorbital techniques for standard blood chemistry. BP of the following groups at 21 days just before weaning was: SHR/y fostered to WKY = 164+/-12 mmHg, SHR/a fostered to SHR/y = 115+/-7 mmHg, SHR/y fostered to SHR = 72+/-4 mmHg, and SHR/a fostered to SHR = 98+/-5 mmHg. In conclusion, hypertensive foster mothers either through milk focused factors or behavioral factors increased the male pup's BP 27 mmHg by day 21 if the male pups also had autocalmous hypertensive genes.

3:45 AN ALPHA-ADRENERGIC BLOCKER DECREASES BLOOD PRESSURE STRESS RESPONSIVENESS IN HYPERTENSIVE AND NORMOTENSIVE RATS AS MEASURED BY AORTIC TELEMETRY. Gail Dumpy, Ann Coplea, Monte Turner, and Daniel Ely, Dept. of Biology, University of Akron, Akron OH 44325-3908.

We examined the blood pressure (BP) and heart rate (HR) responses in the spontaneously hypertensive (SHR), Wistar-Kyoto rat (WKY), and two SHR-derived hybrid backcrosses under acute stress and high Na conditions and after alpha-adrenergic blockade using phentolamine. The two hybrid crosses were bred in our lab to produce males with a Y chromosome from a hypertensive father and normotensive autosomes (SHR/y) or the reciprocal cross producing a male with a normotensive Y chromosome and hypertensive autosomes (SHR/a). BP and HR were measured using an aortic implanted radio-telemetry system. The rats (16-20 wks) were placed on a high Na (3X) diet. Air stress (30 sec) increased BP 21-25% (p<0.05-p<0.01) in rats with a hypertensive Y chromosome but only 11-17% (p<0.01) in rats without the hypertensive Y chromosome. HR increased about 6% in all groups after air stress with no significant strain differences. Alpha adrenergic blockade prevented the stress-induced increase in BP and HR in all groups. HR increased after alpha blockade in all groups (7-42%), however, the SHR group had the highest HR increase of 42% (p<0.001), whereas SHR/a only had a 7% increase. In conclusion, the hypertensive Y chromosome increases pressor responsiveness by about 8-10 (15 mmHg) and maximal HR elevation after alpha blockade appears to require both hypertensive autosomes and the Y chromosome.
Earlier studies showed that collagen content in the mesenteric artery of SHR rats was higher than the WKY strains. However, it remains unclear whether this increased collagen deposition is laid down first causing a rise in the blood pressure (bp), or whether the increased collagen deposition is a compensative reaction to increased bp. In order to examine this question three age groups of both SHR and WKY males and females (n=4/group) were selected: 4, 10, and 20 weeks. BP was measured weekly by the tail cuff method. Mesenteric arteries and aortas were prepared for high pressure liquid chromatography analysis, for hydroxyproline, hearts were taken, and coronaries were prepared and stained with Sirius Red. These were then viewed using an image analysis software program to quantitate collagen content around the coronary. Male SHR had more collagen deposition at all ages than WKY. The bp at all ages was higher in the SHR males as compared to WKY (138 vs. 124 mmHg at four weeks, 172 vs. 145 mmHg at 10 weeks and 200 vs. 145 mmHg at 20 weeks). In conclusion the developmental study showed that collagen differences are apparent simultaneously with increasing bp.

4:30 DETERMINATION OF COLLAGEN CONTENT IN THE CORONARY AND MESENTERIC ARTERIES OF NORMOTENSIVE AND HYPERTENSIVE RATS. DOUG CHONKO, MARIA KARASARIDES, DANIEL SMITH, AND DANIEL ELY, DEPT. OF BIOLOGY, UNIVERSITY OF AKRON, AKRON OH 44325-3906.

The objective of this study was to determine if coronary and mesenteric collagen content was directly correlated with blood pressure (bp) in rats with varying degrees of hypertension. Silicon rubber was injected by retrograde perfusion in the coronary in order to make a cast and the vessels were dissected, defatted, dried, weighed, homogenized, and hydrolyzed for 24 hours at 110 degrees C, and the amino acids were quantitated by high performance liquid chromatography. The SHR strain, which was basically a WKY rat with a Y chromosome from a hypertensive father, had significantly greater collagen in both the coronary and mesenteric arteries than the WKY (28%, 31% increased, p<.05, p<.05 respectively). The SHR strain, which was basically a SHR rat with a Y chromosome from a normotensive father, had significantly less collagen than the SHR group in the coronary and mesenteric arteries (60%, 35% decrease, p<.05, p<.05 respectively). The bp of the four groups at 20 weeks were: SHR-200 +/- mmHg, SHR-Y-139 +/- 3 mmHg, SHR-Y-153 +/- 4 mmHg, WKY-128 +/- 7 mmHg. The collagen in the coronary and mesenteric arteries was found to correlate significantly (r=.75, p<.001, r=.77, p<.001) respectively with bp. In conclusion, the Y chromosome from a hypertensive father significantly contributed to increased bp and either directly or indirectly elevates coronary and mesenteric artery collagen.

Social and Behavioral Sciences Division

PSYCHOLOGY: MEMORY, LEARNING AND COMPREHENSION 9:00 AM - Saturday, April 23, 1994

Huron
John J. Skowronski, Presiding

9:00 THE EFFECTS OF CNQX AND APS AFTER A UNILATERAL ENTORHINAL CORTEX LESION IN A SPATIAL ALTERTATION TASK. LANA JUDETTE RICKS, OHIO WESLEYAN UNIVERSITY, HAMILTON-WILLIAMS BOX 2070, DELAWARE OH 43015.

This study investigated the effects of clonazepam (CNQX) and amphetamine (APS) on a learned spatial alteration task. Sprague-Dawley rats were trained in a spatial alteration task, Y-maze, in which they needed to alternate arms until they met criterion again. The animals were trained daily until they achieved criterion, 80% accuracy for 3 days. The day after achieving criterion the animals were given daily micro-hippocampal injections of CNQX or APS. The hippocampus. Previous research has shown that unilateral entorhinal cortex lesions cause sprouting in the hippocampal formation. The animals were given 14 days to recover after which time the animals were trained until they met criterion again. The day after achieving criterion the animals were given daily micro-hippocampal injections of CNQX or APS. The animals performance in the Y-maze was found to correlate significantly (M).75, p<.05. The animals were then retested with new events, then the events were other-events, negative events were better recalled than other events. The relationship between these findings and the possibility that positive results may have been due to heightened retrieval of the positive events for negative other-events.

9:30 AUTOMATIC AND CONTROLLED PROCESSES IN JUDGMENTS OF HOMOSEXUALITY. TAMARA OPI AND JOHN SKOWRONSKI, OHIO STATE UNIVERSITY AT NEWARK, 1179 UNIVERSITY DR., NEWARK OH 43055-1777.

Prior research (e.g., Skowronski, Carlson & Isham, 1993) indicates that the judgments and memories produced when subjects make judgments by means of relatively automatic process can differ from the judgments and memories produced when judgments are made by means of relatively controlled processes. We attempted to examine this possibility in the context of judgments of homosexuality. Subjects read about a target who exhibited both homosexual-consistent and homosexual-inconsistent behaviors. Some subjects read this description under conditions designed to promote controlled processing, while others read this description under conditions designed to promote automatic processing. Subjects then engaged in a surprise recall task, reported judgments of the target's traits, and reported a judgment of whether the target had a homosexual orientation. The effect of the type of processing on memories and judgments was assessed. In addition, the relation between several individual differences variables thought to be related to the accessibility of the homosexuality construct (homophobia, sex-role strength, gender) and the dependent measures were also examined.

9:45 THE EFFECTS OF INTERSTIMULUS INTERVAL ON THE LEARNING AND PERFORMANCE IN SERIAL FEATURE POSITIVE DISCRIMINATIONS. PATRICIA A. HAMLIN AND PETER C. HOLLAND, COLLEGE OF WOOSTER, BOX C-1766, WOOSTER OH 44691.

In this experiment, rats were trained with operant serial feature positive (SFP) discriminations (X-A, A), in which following during a target cue (A) is reinforced (+) when A is presented by a feature cue (X) and separated by a 5-s or 25-s interval but nonreinforced (-) when A is presented alone. Solution of the task demands that the subjects learn some target feature of the cue feature when the target is presented. This experiment examined effects of imposing retention intervals that were either longer or shorter than the interval used in training to determine if subjects encode temporal aspects of the learning task. Thus, increasing the retention interval would degrade performance by making test conditions progressively more different from training conditions. However, if performance is governed by the strength of a fading memory trace, then performance should get worse when the retention interval is extended beyond the training interval, but improve when the interval is shortened. Different subgroups of rats received different combinations of 5-s and 25-s interstimulus and visual events and B, in order to examine the effects of both modality and similarity of feature and target on learning and memory of these tasks. Although neither modality of the feature cue nor similarity of feature and target cues affected performance, auditory target cues were superior to visual targets. Rats performance when tested with 5-s intervals deteriorated rapidly as the interval was extended to 10, 15, 20, 25, or 30 s, and when it was reduced to 6 s. Similarly, rats trained with 25-s intervals performed reliably poorer at both shorter (0, 5, 15) s and longer (35, 40, 45, 50, and 55 s) test intervals than at original training intervals and those similar (20 and 30 s). These data suggest that performance of a SFP discrimination reflects representation of particular time intervals rather than the fading of a memory trace over time.

10:00 MORE EVIDENCE FOR SPONTANEOUS SOCIAL INFERENCE USING A SAVINGS TASK. MATT CRAWFORD, JOHN SKOWRONSKI, AND PAT QUICKLE, OHIO STATE UNIVERSITY AT NEWARK, 1179 UNIVERSITY DR., NEWARK OH 43055-1777.

A continuing debate exists in the social psychology literature concerning whether, and when, people make spontaneous inferences about others. Part of the difficulty in this area has been the development of a research paradigm that is sensitive to inference-making, but that does not directly ask subjects to report their inferences (which could itself prompt the inferential process). In a series of studies (Cohen & Skowronski, 1994) evidence indicating that such inferences are made comes from a savings task. Subjects are presented with a target and asked, after first being exposed to a behavior that has trait implications presented with a photo of the person, subjects later more easily learn a person photo-relevant trait word pairing in a paired associates task (a savings effect). In the present study, we explored whether these savings effects require that inferences be made consciously, or whether these effects require recall of the relevant behavior.

10:15 CEBUS APELLA'S UNDERSTANDING OF LAWS OF GRAVITY AS EVIDENCED THROUGH PREFERENTIAL LOOKING. PATRICIA A. HAMLIN AND CLAUDIA R. THOMPSON, COLLEGE OF WOOSTER, BOX C-1766, WOOSTER OH 44691.

The present research examined the existing knowledge. Cebus apella monkeys have about physical concepts such as gravity. These experiments extended and combined research on infants with research on infant chimpanzees. In the primary experiment, monkeys
were more variable in their aggressiveness than females. The experimental conditions pro-
duced changes for males but not for females. For males, both experimental conditions produced
changes in aggression in comparison to the control condition. Manipulation of aggressive
behaviors of recruits were found to be only partially appropriate accounts of self-atraction and retention of members. Group processes involving rewards, sanctions, modeling, and a compelling semiotic system fostering a particular group-bonding social construction of
reality were determined to amply explain the profound conformity observed within the sect. In
contradiction to the popular “brainwashing” and “snapping” models, it was concluded that the
increase which operate in authoritarian groups likely differ only in extent or intensity, and not
in kind, from the socializing and consensus-sustaining forces which operate in any social group
or in society at large.

1:45 MULTIPLE-TRAIT IMPRESSION FORMATION IN DEPRESSED AND NONDEPRESSED SUBJECTS. MICHELLE MONROE AND JOHN SKOROWSKI, OHIO STATE UNIVERSITY AT NEWARK, 1170 UNIVERSITY DR., NEWARK OH 43055-1797.

Research by Carlson (1979) indicates that people are more likely to derive multiple trait
inferences about a person from a person description containing multiple behavioral episodes
that each have relatively clear implications for a single trait than from a person description
containing a single behavioral episode that has implications for multiple traits. Our research
attempts to replicate this finding, and examines whether this outcome may depend on the
personality of the perceiver. Because recent research by Weary and her colleagues has indicated
that mild to moderate depressives process social information differently than non-depressives, we examined whether mild to moderate depressives (as measured by the Beck Depression Inventory) and non-depressives differ in their tendency to draw multiple inferences from single-implication and multiple-implication behavioral episodes.

2:00 VARIATIONS AND MODIFICATION OF MALE ANGER. CAROL COSTLOW, CREISTE I. PATRIO, & SARA R. STAATS, 7123 NATIONAL RD., PATALASKA OH 43082.

Aggression and the expression of anger are pre-eminent problems in the United States.
Much of the aggression and violence is perpetuated by young males and so they are a
population of special interest. Aggression is primarily an interpersonal and is often
situation specific. In this experiment, we used a mood induction technique to influence
aggression toward a designated target, “an older person” who was presented in six different
dimensions. Forty-two male and 66 female undergraduates from a psychology class (mean age
32.8, S.D. = 8.1) volunteered for partial course credit. Control subjects responded to the
Situation Reaction Inventory, an instrument that presents target individuals in typical agnostic
situations. Experimental subjects first were asked to recall specific situations, e.g. a time when
they felt sorry or empathetic for an older person (Experimental One) or a time when an older
person felt sorry or empathetic for them (Experimental Two). Research by Carlston (1979) indicates that people are more likely to derive multiple trait
inferences about a person from a person description containing multiple behavioral episodes
that each have relatively clear implications for a single trait than from a person description
containing a single behavioral episode that has implications for multiple traits. Our research
attempts to replicate this finding, and examines whether this outcome may depend on the
personality of the perceiver. Because recent research by Weary and her colleagues has indicated
that mild to moderate depressives process social information differently than non-depressives, we examined whether mild to moderate depressives (as measured by the Beck Depression Inventory) and non-depressives differ in their tendency to draw multiple inferences from single-implication and multiple-implication behavioral episodes.

2:05 WISHES AND EXPECTATIONS FOR CHANGE AND RESPONSES TO THREAT IN BATTERED AND NON-BATTERED WOMEN. CREISTE I. PATRIO & SARA R. STAATS, OHIO STATE UNIVERSITY AT NEWARK, 1170 UNIVERSITY DR., NEWARK OH 43055-1797.

Differences between battered and non-battered women’s wishes and expectations for change and their responses to threat were examined. Twenty-two battered and fifteen non-battered women from a small mid-western commuter campus completed a modified version of the Hope Index and the Situational Reactions Scale (SRS). There were no significant differences between battered and non-battered women on terms of income, education, or marital status. Battered women scored significantly higher than non-battered women on wishes for their partners to change and wishes for themselves to change. However, there were no differences between battered and non-battered women’s expectations for change for their partners or themselves. Differences show that battered women’s expectations for change were significantly lower than non-battered women’s expectations for change for both themselves and their partners. The study did not find any differences between battered and non-battered women on the variables of ideal’s score on wish and wish scores on wish for themselves. Battered women scored significantly higher on the SRS sub-scale dealing with threat. There were no significant differences between battered and non-battered women on the other SRS sub-scales dealing with different situations. Battered women scored highest on the SRS sub-scale dealing with threat when the instigator in the situation was a man. Possible causes and implications of these findings will be discussed.

2:30 PERCEPTIONS OF COHESION, ADAPTABILITY, AND CONFLICT RESOLUTION AMONG BATTERERS. GLENN A. SHIELDS, D.S.W., DEPT. OF SOCIAL WORK, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

A family functioning model was used to assess conflict resolution among 53 male batters
who were court ordered into an 18 week domestic violence treatment program. The tactics of
the batters were identified through the use of Straus’ 1979 Conflict Tactics Scales (CTS). The
CTS measures three levels of tactics that are most often used to resolve conflict among those
involved in domestic violence; non-violent, low or moderate verbal tactics and physical violence. The various types of conflict resolution tactics were compared to three major family types; balanced, moderate, and extreme families. Family types were identified within the context of the Circumplex Model of family functioning (Olson, Russell, and Sprentik, 1979). In addition to the CTS, each respondent was administered the Family Adaptability Cohesion Evaluation Scale (FACES) (Olson, et al., 1985) as part of the assessment process. This model of family functioning hypothesizes 16 family types based on two major dimensions, cohesion and adaptability. The research used a completely deviant population (spouse abusers) to try and determine the usefulness of this model to identify characteristics of abuse. The hypothesis states that families who are more balanced to moderate in terms of cohesion and adaptability will be more flexible, utilize reasoning, and compromise in conflict resolution. Families who perceive themselves as more extreme in terms of cohesion and adaptability will be more likely to use verbal aggression and physical violence to resolve conflict. Implications for practice and further research are identified.

2:45 SOCIAL WORK ADVOCACY ON BEHALF OF THE MENTALLY DISABLED PURSUANT TO THE AMERICANS WITH DISABILITIES ACT, A COST/BENEFIT FACTORING APPROACH. ROBERT M. CIRRAZ, J.D., M.S.W., BUSINESS ADMINISTRATION DEPT., 25 MILLER HALL, ASHLAND UNIVERSITY, ASHLAND OH 44805.

The Americans with Disabilities Act of 1990 expands the advocacy role of the clinical social
worker, occupational social worker, and case manager. Effective July 26, 1992, ADA prohibits
employers, state and local governments, employment agencies and labor unions from discrimi-

nating against individuals with physical or mental disabilities. However, a client-centered
advocacy approach must include a cost/benefit analysis on behalf of individuals with a
diagnosis of major mental illness. A twelve-point evaluative process is presented to illustrate
that the advocacy role is utilized only in situations where the value of the employment relationship
exceeds the immediate and potential economic, social and psychological hardships which
accompany a major life-changing event. A psycho-social legal approach is utilized.

3:00 CLINICAL AND LEGAL ISSUES RELATED TO PSYCHOLOGICAL ASSESSMENT OF THE MENTALLY DISABLED PURSUANT TO THE AMERICANS WITH DISABILITIES ACT. ROBERT M. CIRRAZ, J.D., M.S.W., BUSINESS ADMINISTRATION DEPT., 25 MILLER HALL, ASHLAND UNIVERSITY, ASHLAND OH 44805.

Title I of the Americans with Disabilities Act of 1990 which took effect July 26, 1992, prohibits employers, state and local governments, employment agencies and labor unions
from discriminating against qualified individuals with physical or mental disabilities in the application for employment process, hiring, discharging, advancement, compensation, job training and other terms and conditions of employment. Failing to comply will result in both financial penalties and loss of federal funding. The purpose of the presentation is to examine some of the legal and ethical issues in the assessment of individuals with diagnoses of major mental disorders: (1) diagnosis, (2) assessment of past and present functioning, (3) prognosis as it relates to course of illness, including behavior characteristics and variability of medication for aggressive behavior, (4) type of accommodation which would permit the individual to perform the employment tasks. A step-by-step analysis to avoid civil liability in ADA related assessment matters is presented to insure a sound clinical approach to individuals who have identifiable mental disorders and with or without reasonable accommodation can function in an employment relationship.