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**Illinois State
Academy of Science**
Supplement to Volume 85

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BOTANICAL GARDEN

**85th Annual Meeting
October 16-17, 1992**

**ILLINOIS STATE MUSEUM
and
SANGAMON STATE UNIVERSITY
Springfield, Illinois**

\$3.00

T

PROGRAM AND ABSTRACTS
OF THE
ILLINOIS STATE ACADEMY OF SCIENCE
85TH ANNUAL MEETING

THEME:

"SCIENCE LITERACY: STRATEGIES FOR SURVIVAL"

ILLINOIS STATE MUSEUM
AND
SANGAMON STATE UNIVERSITY

SPRINGFIELD, ILLINOIS

OCTOBER 16 - 17, 1992



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THE ILLINOIS STATE ACADEMY OF SCIENCE

WISHES TO THANK

THE FOLLOWING ORGANIZATIONS FOR CONTRIBUTING FUNDS

FOR THE 1992 ANNUAL MEETING

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85TH ANNUAL MEETING

**ILLINOIS STATE MUSEUM
and
SANGAMON STATE UNIVERSITY**

SPRINGFIELD, ILLINOIS

OCTOBER 16 - 17, 1992

REGISTRATION

Participants are urged to pre-register for the ISAS Annual Meeting by returning the enclosed Registration Form with a payment of \$20.00 (\$10.00 for student members, \$30.00 for non-members) to the Treasurer. The deadline for receipt of the pre-registration form is October 8, 1992. Luncheon and Dinner Tickets should be reserved when you pre-register and may be picked up at the Registration Table on Friday, October 16, at Sangamon State University.

On-site registration will be conducted during both days of the meeting. On-site registration fee is \$25.00 for regular members, \$12.50 for student members and \$40.00 for non-members.

Participants must register and have their ISAS name tag before they can participate in the ISAS meeting activities.

HOTEL ACCOMMODATIONS

A block of rooms has been reserved to accommodate Annual Meeting participants for overnight stay on FRIDAY, OCTOBER 16TH, at the Days Inn Motel, 3000 Stevenson Drive, Springfield, Illinois 62703 at the special group rate - \$34.00 single, \$39.00 double, plus 10% tax. There are 20 single and 20 double rooms available for reservation on a first-come first-serve basis. Interested parties should call the motel directly (217-529-0171) or (800-325-2525) to make a confirmed reservation. Mention that you are an ISAS participant. This block of rooms will be released to the public on October 9TH, 1992. After October 9TH reservations will be accepted on a space available basis and the discount rate is no longer guaranteed.

If you will be arriving by airplane or train, the motel will be happy to provide complimentary transportation to their Inn. They will also provide a shuttle to and from Sangamon State University for the meeting.

The Days Inn Motel is easily accessible from Interstate 55. Take Exit #94, (Stevenson Drive) and go west about 2 blocks. Motel is on the left side of Stevenson Dr.

TRAVEL INFORMATION

The Illinois State Museum and Sangamon State University are accessible by car. Refer to the Springfield map in this publication for the most direct route from your location within the city.

PARKING

Parking is available for Academy members in Sangamon State University Parking Lots "C" and "D" free of charge. **Please note: Do not park in any other lot** as they are restricted and vehicles left there will be ticketed. Please check your Campus Map for location of parking areas "C" and "D".

If you have any questions concerning the 85TH Annual Meeting of the Illinois State Academy of Science, please contact:

Robert W. Steffan
Illinois State Museum
Spring & Edwards Streets
Springfield, IL 62706

Telephone: (217) 782-5955
FAX: (217) 782-1254

MENTION ILLINOIS STATE ACADEMY OF SCIENCE WHEN MAKING ROOM RESERVATIONS.

NOTE: Prices subject to change without notice

REMEMBER: Mention the ILLINOIS STATE ACADEMY OF SCIENCE to get the State Discount!!!

HOTEL/MOTEL	SINGLE	DOUBLE	PHONE #
Best Inns of America 500 N. 1ST Street	\$40.88	\$46.88	217-522-1100
Best Western Lincoln Plaza Hotel 101 E. Adams Street	\$42.00	\$42.00	217-523-5661
Best Western Sky Harbor Inn 1701 J. David Jones Parkway	\$40.00	\$45.00	217-753-3446
Days Inn Motel 3000 Stevenson Drive	\$34.00	\$39.00	217-529-0171 800-325-2525
Hampton Inn 3185 S. Dirksen Parkway	\$45.00	\$50.00	217-529-1100
Hilton of Springfield 700 E. Adams Street	\$49.99	\$59.99	217-789-1530
Holiday Inn East 3100 S. Dirksen Parkway	\$60.00	\$68.00	217-529-7171
Howard Johnson Motel 3190 S. Dirksen Parkway	\$45.00	\$51.00	217-529-9100
Quality Inn 400 N. 9TH Street	\$36.00	\$41.00	217-522-7711
Ramada Renaissance Hotel 701 E. Adams Street	\$49.00	\$64.00	217-544-8800
Red Roof Inn I-55 & South Grand Avenue	\$33.99	\$39.99	217-753-4302
Super 8 Lodge 1330 S. Dirksen Parkway	\$34.09	\$41.29	217-528-8889
Econo Lodge 3751 S. 6TH Street	\$32.00	\$36.00	217-529-5511

MEALS

ISAS BUFFET LUNCHEON FRIDAY, October 16, 1992 will be served in the Restaurant on the lower level of the Public Affairs Center at Sangamon State University from 11:30 to 12:30. Lunch will be followed by the Annual Business Meeting and will conclude by 1:15 in time for the afternoon Paper Sessions. Luncheon tickets, \$10.00 per person, must be purchased by pre-registration.

ISAS BANQUET FRIDAY, October 16, will be held in the Exhibit Halls of the Illinois State Museum beginning at 7:15 P.M. We would like to recognize Past Presidents of the Academy at this banquet and ask that if you are a Past President please let us honor you by setting at a special table reserved for Past Presidents and their guest. The Banquet will be preceded by the Poster Session and Reception beginning at 5:30 P.M. in the Arts and Sciences Gallery on the lower level of the Museum. At the conclusion of the Banquet, the Keynote Address will be presented in the Thorne Deuel Auditorium, located on the Museum's Lower Level. Banquet tickets, \$25.00 for regular members and their spouse, \$20.00 for students, and \$35.00 for guest, must be purchased by the pre-registration deadline.

POSTER SESSION/KEYNOTE ADDRESS

Individuals participating in the 5:30 P.M. Poster Session at the Illinois State Museum may have access to the lower level area beginning at 3:00 o'clock. Free parking is available in the large lot directly west of the Museum with entry on Edwards Street. Please consult with the Museum Receptionist in the first floor Lobby for additional directions.

The posters will be available for viewing during a Reception in the Arts and Sciences Gallery on the Illinois State Museum's lower level from 5:30 P.M. to 7:15 P.M. on Friday, October 16th.

The Keynote Address will be presented by Dr. Leon M. Lederman in the Thorne Deuel Auditorium of the Illinois State Museum at 9:00 P.M. Dr. Lederman received the Nobel Prize in Physics in 1988 while serving as Director of the Fermi National Laboratory in Batavia, Illinois. He is currently a Frank L. Sulzberger Professor in the Department of Physics at the University of Chicago. His theme will be "Science Literacy: Strategies for Survival".

Abstracts of the Poster Session and Keynote Address are presented in this program.

SUMMARY OF EVENTS

FRIDAY, 16 OCTOBER, 1992	ILLINOIS STATE MUSEUM AND SANGAMON STATE UNIVERSITY
8:30 a.m. - 4:00 p.m.	Registration - 2nd Floor, Health and Sciences Building, Sangamon State University (The 2nd Floor is located at ground level of the Plaza)
9:00 a.m. - 11:15 a.m.	Paper Sessions - Sangamon State University (See Program)
11:30 a.m. - 1:15 p.m.	*Buffet Luncheon and Annual Business Meeting Lower Level, Public Affairs Center, Sangamon State University
1:30 p.m. - 4:30 p.m.	Paper Sessions - Sangamon State University (See Program)
3:00 p.m.	Access to display set-up area for Poster Session Presentation, Illinois State Museum
5:30 p.m. - 7:15 p.m.	Poster Session and Wine and Cheese Reception, Arts and Sciences Gallery, Lower Level, Illinois State Museum
7:15 p.m. - 8:45 p.m.	*Banquet - Exhibit Halls, Illinois State Museum
9:00 p.m. - 10:00 p.m.	Keynote Address - "SCIENCE LITERACY: STRATEGIES FOR SURVIVAL" - Dr. Leon M. Lederman Thorne Deuel Auditorium, Lower Level, Illinois State Museum

SATURDAY, 17 OCTOBER, 1992	SANGAMON STATE UNIVERSITY
8:00 a.m. - 12:00 noon	Registration - 2nd Floor, Health and Sciences Building, Sangamon State University (The 2nd Floor is located at ground level of the Plaza)
8:00 a.m. - 11:30 a.m.	Paper Sessions - Sangamon State University (See Program)

ALL PAPER SESSIONS WILL BE HELD AT SANGAMON STATE UNIVERSITY.

*Luncheon and banquet tickets should be reserved during pre-registration and will be issued at the registration desk located on the 2nd Floor of the Health and Sciences Building at the University.

ISAS ACADEMY LUNCHEON MENU
SANGAMON STATE UNIVERSITY, PUBLIC AFFAIRS CENTER, Lower Level
Friday, October 16, 1992 - 11:30 a.m.

Salad

Caesar Salad with Artichoke Hearts

Entree

Grilled Boneless Breast of Chicken with Mustard-Creole Sauce
Brown and Wild Rice with Waterchestnuts and Sautee'd Mushrooms
Sautee'd Spring Vegetables with Tarragon Butter

Dessert

Assorted Homestyle Fruit and Cream Pies

Rolls, Butter, and Beverages

(Cost: \$10/per person)

RECEPTION DURING POSTER SESSION

ILLINOIS STATE MUSEUM, Lower Level
Friday, October 16, 1992 - 5:30 p.m.

Wine and Hors d'Oeuvres

ISAS ACADEMY BANQUET

ILLINOIS STATE MUSEUM
Friday, October 16, 1992 - 7:15 p.m.

Salad

Mixed Greens with Mandarin Oranges, Avocados, Fresh Gulf Shrimp, Grilled Scallops,
Red Onion Ribbons and served with Blackberry Vinaigrette Dressing

Entree

Slow Hickory Smoked Loin of Pork with Balsamic Vinegar Demi Glace
Pot-Pouri of Baby Vegetables in Pattypan Bird's Nest
Gnocchi with Pesto and Marinara in Crescent Pate Choux

Rolls

Baskets of Tiny Croissants, Herb Breadsticks and Baguettes

Dessert

Chocolate-Chocolate Chip Crepe
with White Chocolate-Cream Sauce and Strawberry Accents

Beverages

Fresh Brewed Cinnamon and Decaffinated Coffee

(Cost: Meeting Registrants \$25; Student Registrants \$20; Non-Registrant Guests \$35)

85TH ANNUAL MEETING

ILLINOIS STATE MUSEUM
AND
SANGAMON STATE UNIVERSITY
SPRINGFIELD, ILLINOIS

KEYNOTE ADDRESS

"SCIENCE LITERACY:
STRATEGIES FOR SURVIVAL"

SPEAKER

DR. LEON M. LEDERMAN
NOBEL LAUREATE IN PHYSICS AT FERMI NATIONAL LABORATORY
BATAVIA, ILLINOIS

FRANK L. SULZBERGER PROFESSOR OF PHYSICS
UNIVERSITY OF CHICAGO

OCTOBER 16, 1992 - 9:00 p.m.

THORNE DEUEL AUDITORIUM
ILLINOIS STATE MUSEUM, Lower Level

Science Literacy: Strategies for Survival

The crisis in American education, publicly perceived in its current phase by the 1983 report, *A Nation at Risk*, has altered scope and direction over the past decade. Science literacy has emerged as at least attention getting and this has been complemented by the changing culture in science and technology. My remarks will stress practical steps in the context of an overarching concern that this changing culture is not appreciated enough. Until we can reach the general public, we will probably not move policy makers.

PAPER SESSIONS

AGRICULTURE DIVISION

DIVISION CHAIR:
 Steven E. Kraft
 Department of Agribusiness
 Southern Illinois University
 Carbondale, IL 62901

HEALTH & SCIENCES BLDG.
ROOM: 302

SESSION I - Saturday, October 17

PRESIDING: Steven Kraft

TIME PAPER #

9:00 AM	1	ECONOMICAL UTILIZATION OF ETHANOL BY-PRODUCTS. <u>P.L. Harms</u> , <u>P.R. Eberle</u> and <u>A.W. Young</u> , Southern Illinois University, Carbondale.
9:15 AM	2	AN EVALUATION OF ILLINOIS FARMER'S ATTITUDES ON SUSTAINABLE AGRICULTURE. <u>J.A. Chmiola</u> and <u>P.R. Eberle</u> , Southern Illinois University, Carbondale.
9:30 AM	3	FARMER ATTITUDES TOWARDS ALTERNATIVE POLICIES TO CONTROL THE AGRICULTURAL CONTAMINATION OF GROUNDWATER. <u>S. Steinback</u> , <u>C. Lant</u> and <u>S. Kraft</u> , Southern Illinois University, Carbondale.
9:45 AM	4	REACTIONS OF STUDENTS TO ENVIRONMENTAL PROBLEMS; USE OF THE NEW ENVIRONMENTAL PARADIGM. <u>T.F. Kraft</u> and <u>S.E. Kraft</u> , Southern Illinois University, Carbondale.
10:00 AM	5	REINTRODUCTION OF RUBBER AS AN AGRICULTURAL EXPORT FOR BRAZIL. <u>R.N. Woll</u> , N. Woll and Company, San Jose.
10:15 AM		DIVISION BUSINESS MEETING

BOTANY DIVISION

DIVISION CHAIR:

Marian Smith

Department of Biological Sciences

Southern Illinois University

Edwardsville, IL 62026

HEALTH & SCIENCES BLDG.ROOM: 152SESSION I - Friday, October 16PRESIDING: Marian SmithTIMEPAPER #

9:00 AM 6

EFFECTS OF GAS PIPELINE RIGHT-OF-WAY VEGETATION ON A POORLY DRAINED DECIDUOUS FOREST EDGE IN MIDLAND COUNTY, MICHIGAN: FERNS, NOTABLE COMPONENTS OF THE UNDER-STORY. J.R. Rastorfer, Chicago State University, Chicago, J.E. Frelichowski, University of Illinois, Urbana, G.D. Van Dyke, Trinity Christian College, Palos Heights, and S.D. Zellmer, Argonne National Laboratory, Argonne.

9:15 AM 7

ALGAL POPULATION DYNAMICS IN TWO ACID (pH=3.0) SURFACE MINE LAKES FROM SOUTHERN ILLINOIS. J. Watral and R. Brudam, Southern Illinois University, Edwardsville

9:30 AM 8

MEGAFOSSIL FLORA FROM THE UPPERMOST DEVONIAN OF HOOK HEAD, COUNTY WEXFORD, IRELAND. L.C. Matten, Southern Illinois University, Carbondale.

9:45 AM 9

TESTING THE RESPONSE OF THREE LITTLE BLUESTEM (SCHIZACHYRIUM SCOPARIUM) POPULATIONS TO MYCORRHIZAL FUNGAL INNOCULUM FROM A SINGLE SOURCE. R.C. Anderson and K.J. Roberts, Illinois State University, Normal.

10:00 AM

BREAK

10:15 AM 10

INFLUENCE OF VARIED LEVELS OF IRRADIANCE ON THE GROWTH AND PHOTOSYNTHETIC RATES OF GARLIC MUSTARD (Alliaria petiolata). T.M. Kelley and R.C. Anderson, Illinois State University, Normal, and S.S. Dhillon, Texas Tech University, Lubbock, Texas.

- 10:30 AM 11 NUCLEIC ACID, PROTEIN, AND NUCLEAR AND NUCLEOLAR VOLUME PATTERNS IN HAIR CELLS OF THE YOUNG AND SENESCING MAY APPLE LEAF. P.K. Bhattacharya, Indiana University Northwest, Gary, Indiana and A.J. Pappelis Southern Illinois University, Carbondale.
- 10:45 AM 12 THE GREEN WING ENVIRONMENTAL LABORATORY: A NEW FIELD STATION IN NORTHERN ILLINOIS. B. Dziadyk, Augustana College, Rock Island.
- 11:00 AM 13 CYTOFLUOROMETRIC QUANTITATION OF THE NUCLEAR DNA IN STAMINAL HAIR CELLS OF TRADESCANTIA, AND OXAMYL EFFECT. P.K. Bhattacharya, Indiana University Northwest, Gary, Indiana and W.K.L. Lee and A.J. Pappelis, Southern Illinois University, Carbondale.
- 11:30 AM LUNCHEON AND ISAS BUSINESS MEETING

SESSION II - Friday, October 16

ROOM: 152

- TIME PAPER # PREDISING: Marian Smith
- 1:30 PM 14 GERMINATION AND BOLTING IN BOLTONIA DECURRENS GROWN FROM MORPHOLOGICALLY DIFFERENT SEED TYPES. S. Musholt and M. Smith, Southern Illinois University, Edwardsville.
- 1:45 PM 15 EFFECTS OF SOIL MOISTURE AND NUTRIENT STATUS ON GERMINATION AND GROWTH OF BOLTONIA DECURRENS. Shawn Turner and Marian Smith, Southern Illinois University Edwardsville
- 2:00 PM 16 EFFECTS OF SOIL TYPE ON THE COMPETITION AND BIOMASS PRODUCTION OF BOLTONIA DECURRENS ROSETTES WHEN GROWN INTRASPECIFICALLY AND WITH BOLTONIA ASTEROIDES. E.D. Melton, III and M. Smith Southern Illinois University, Edwardsville
- 2:15 PM 17 POPULATION STUDY OF BOLTONIA DECURRENS, A FEDERALLY THREATENED PLANT SPECIES. Anjela Reynolds and Marian Smith, Southern Illinois University, Edwardsville
- 2:30 PM BREAK

- 2:45 PM 18 CYTOFLUOROMETRIC STUDY OF SENESCING LEAF EPIDERMAL NUCLEI OF PODOPHYLLUM FELTATUM IN RESPONSE TO PUCCINIA PODOPHYLLI SCHW. P.K. Bhattacharya, Indiana University Northwest, Gary, Indiana and A.J. Pappelis Southern Illinois University, Carbondale.
- 3:00 PM 19 ILLINOIS SPECIES OF VOLVARIELLA (BASIDIOMYCETES, AGARICALES, PLUTEACEAE). H.L. Monoson, Bradley University, Peoria, A.S. Methven, Eastern Illinois University, Charleston, and W.J. Sundberg, Southern Illinois University, Carbondale.
- 3:15 PM 20 DISTRIBUTION OF EPIPHYTIC LICHEN COMMUNITIES ON SELELCTED TREES IN EAST CENTRAL ILLINOIS. M.R. Thon and A.S. Methven, Eastern Illinois University, Charleston.
- 3:30 PM 21 CHANGES IN NUCLEAR PROTEINS, NUCLEIC ACIDS, AND NUCLEOLAR AND NUCLEAR VOLUMES IN EPIDERMAL NUCLEI OF ALLIUM CEPA FOLLOWING EXPOSURE TO AMBIENT ATMOSPHERE FOR VARIOUS TIME PERIODS. P.K. Bhattacharya, Indiana University Northwest, Gary, Indiana, C.S. Karagiannis and A.J. Pappelis, Southern Illinois University, Carbondale.

SESSION III - Saturday, October 17 ROOM: 152

- TIME PAPER # PRESIDING: Marian Smith
- 9:00 AM 22 THE MUSHROOM GENUS PLUTEUS (PLUTEACEAE, AGARICALES) IN ILLINOIS. P. Banerjee and W.J. Sundberg, Southern Illinois University, Carbondale.
- 9:15 AM 23 RELATIVE SENSITIVITIES OF DIATOMS TO SELECTED HEAVY METALS. J.E. Carlson and C.L. Pederson, Eastern Illinois University, Charleston.
- 9:30 AM 24 POPULATION MEASUREMENT IN SELENASTRUM CAPRICORNUTUM. K. Havel and F.B. Kulfinski, Southern Illinois University, Edwardsville.
- 9:45 AM 25 USE OF POPULATION GROWTH CURVE DYNAMICS TO DETERMINE DEGREE OF TOXICITY OF COPPER TO ALGAE. R. Angelbeck and F.B. Kulfinski, Southern Illinois University, Edwardsville.

- 10:00 AM BREAK
- 10:15 AM 26 RESPONSE OF PRAIRIE/FOREST ECOTONAL SHRUBS TO FIRE. R.C. Anderson, Illinois State University, Normal and J.S. Schwegman, Division of Natural Heritage, IDOC, Springfield.
- 10:30 AM 27 OXAMYL AND BENOMYL ACT AS MITOTIC POISONS IN TRADESCANTIA CLONE 4430 BUT NOT IN CLONE 02. Wilfred K.L. Lee, John C. Veremis and A.J. Fappelis, Southern Illinois University, Carbondale.
- 10:45 AM 28 FUNGI OF THE SAND PRAIRIE-SCRUB OAK NATURE PRESERVE, MASON CO., ILLINOIS. A.S. Methven, Eastern Illinois University, Charleston.
- 11:00 AM 29 TEACHING ENVIRONMENTAL CONCEPTS: "ENDANGERED PLANTS", A VIDEO WITH SUPPLEMENTARY TEACHING MATERIALS FOR JUNIOR HIGH STUDENTS. M. Smith and M. Grant, Southern Illinois University, Edwardsville.
- 11:15 AM DIVISION BUSINESS MEETING - All Botany Division Members

CELL, MOLECULAR AND DEVELOPMENTAL BIOLOGY

DIVISION CHAIR:
Howard E. Buhse, Jr.
Department of Biological Sciences
University of Illinois
Chicago, IL 60680

HEALTH & SCIENCES BLDG.
ROOM: 302

SESSION I - Friday, October 16

PRESIDING: Howard Buhse

TIME PAPER #

- 9:00 AM 30 PREPARATION OF AN IN VITRO TRANSLATION SYSTEM FROM BARLEY ALEURONE LYSATES. Tracy Pinkelton and Mark Brodl, Knox College, Galesburg.
- 9:15 AM 31 THE EFFECT OF HEAT SHOCK ON THE CYTOSKELETON OF BARLEY ALEURONE CELLS. Jennifer Lonsdale and Mark Brodl, Knox College, Galesburg.

- 9:30 AM 32 CATALYTIC HYDROGENATION AND THERMOPROTECTION IN BARLEY ALEURONE CELLS. Tim Filas and Mark Brodl, Knox College, Galesburg.
- 9:45 AM 33 THERMOTOLERANCE OF BARLEY ALEURONE CELLS BY SLOW RATES OF HEATING. Tracy M. Rodgers and Mark R. Brodl, Knox College, Galesburg.
- 10:00 AM BREAK
- 10:15 AM 34 MEMBRANE PHOSPHOLIPID COMPOSITION AND ITS POTENTIAL LINK TO SECRETORY PROTEIN mRNA STABILITY DURING HEAT SHOCK. Mark R. Brodl, Knox College, Galesburg.
- 10:30 AM 35 AN ULTRASTRUCTURAL AND HISTOCHEMICAL STUDY OF THE DIGESTIVE TRACT OF THEMISTE LAGENIFORMIS (Phylum Sipuncula). L.K. Dybas and S. Kishore, Knox College, Galesburg.
- 10:45 AM 36 CORRELATION OF STRUCTURE AND FUNCTION IN URNS OF PHASCOLOSOMA PERLUCENS (Phylum Sipuncula). L.K. Dybas and L. Samuel, Knox College, Galesburg.
- 11:00 AM 37 ULTRASTRUCTURAL EFFECTS OF PRIMARY ALCOHOLS ON FAT BODY CELLS OF DROSOPHILA MELANOGASTER. Marc L. Martel, L.K. Dybas and B.W. Geer, Knox College, Galesburg.
- 11:30 LUNCHEON AND ISAS BUSINESS MEETING

SESSION II - Friday, October 16 PRESIDING: Howard Buhse

- 1:30 PM 38 ANOMALOUS BEHAVIOR OF PORCINE BETA-GALACTOSIDASE ON CONCAVALIN A-SEPHAROSE. W. Kaiser, S. DeLon, M. Pineiro and W. Daniel, University of Illinois, Urbana.
- 1:45 PM 39 ISOLATION AND PARTIAL PURIFICATION OF THE PUTATIVE TETRAHYMENA CALTRACTIN/CENTRIN HOMOLOGUE. J.J. Maciejewski, E.J. Vacchiano and H.E. Buhse, Jr., University of Illinois, Chicago.
- 2:00 PM 40 RESULTS OF IMMUNOLOGICAL STUDIES USING PUTATIVE VORTICELLA SPASMIN PROTEINS. E.J. Vacchiano and H.E. Buhse, Jr., University of Illinois, Chicago.
- 2:15 PM DIVISION BUSINESS MEETING

CHEMISTRY DIVISION

DIVISION CHAIR:

Philip D. Morse, II
 Department of Chemistry
 Illinois State University
 Normal, IL 61761

BROOKENS LIBRARY
ROOM: 376

SESSION I - Friday, October 16

PRESIDING: Philip Morse

<u>TIME</u>	<u>PAPER #</u>	
9:00 AM	41	SOLVENT EFFECTS IN THE REACTION OF CARBOETHOXYCARBENE WITH AN ALKENE. <u>Alexandra Katauskas</u> and <u>JoAnn DeLuca</u> , Illinois State University, Normal.
9:15 AM	42	THE INFLUENCE OF SUBSTRATE METHOXY AND HYDROXY GROUPS ON THE ADDITION OF DICHLOROCARBENE TO A DOUBLE BOND. <u>Douglas W. Walker</u> and <u>JoAnn P. DeLuca</u> , Illinois State University, Normal.
9:30 AM	43	SYNTHESIS OF PORPHYRINS WITH SEVEN- AND EIGHT- MEMBERED EXOCYCLIC RINGS. <u>Jolie A. Bastian</u> and <u>Timothy D. Lash</u> , Illinois State University, Normal.
9:45 AM	44	STANDARDS FOR THE ANALYSIS OF HIGH MOLECULAR WEIGHT PETROPORPHYRINS: SYNTHESIS OF A PORPHYRIN DIMER WITH A TWO CARBON SPACER UNIT. <u>Charles V. Rice</u> and <u>Timothy D. Lash</u> , Illinois State University Normal.
10:00 AM	45	SYNTHESIS OF NAPHTHOPORPHYRINS. <u>Tracy J. Roper</u> , <u>Carl P. Denny</u> and <u>Timothy D. Lash</u> , Illinois State University, Normal.
10:15 AM		BREAK
10:30 AM	46	AN ESSENTIAL REACTIVE CYSTEINE IN THE MITOCHONDRIAL FORM OF PHOSPHOENOPYRUVATE CARBOXYKINASE FROM THE CHICKEN. <u>J.J. Pflug</u> and <u>S.L. Weldon</u> , Illinois State University, Normal.
10:45 AM	47	THE VICINAL CYSTEINE IN PHOSPHOENOLPYRUVATE CARBOXYKINASE OF CHICKEN MITOCHONDRIA. <u>K.A. Bode</u> and <u>S.L. Weldon</u> , Illinois State University, Normal

- 11:00 AM 48 BACTERIAL EXPRESSION OF THE CYTOSOLIC FORM OF CHICKEN PHOSPHOENOLPYRUVATE CARBOXYKINASE. R.A. Worthington and S.L. Weldon, Illinois State University, Normal.
- 11:15 AM 49 BACTERIAL EXPRESSION OF THE MITOCHONDRIAL FORM OF PHOSPHOENOLPYRUVATE CARBOXYKINASE FROM THE CHICKEN. M.F. Simone and S.L. Weldon, Illinois State University, Normal.
- 11:30 AM 50 MONOCLONAL ANTIBODIES AS STRUCTURAL PROBES OF THE ISOZYMES OF PHOSPHOENOLPYRUVATE CARBOXYKINASE. M.L. Hamilton, A.A. Vance and S.L. Weldon, Illinois State University Normal.
- 11:45 LUNCHEON AND ISAS BUSINESS MEETING

SESSION II - Friday, October 16PRESIDING: Philip MorseTIME PAPER #ROOM: 376 BROOKENS LIBRARY

- 1:30 PM 51 THE EFFECTS OF EXERCISE DETRAINING ON VON WILLERBRAND FACTOR IN BLOOD PLASMA OF MALE RATS. J.S. Christopherson, Michelle Ross and M.A. Jones, Illinois State University, Normal.
- 1:45 PM 52 EVALUATION OF SKIN LIPID CONTENT FROM EXERCISING AND CONTROL RATS. Kathy Wescom and M.A. Jones, Illinois State University Normal.
- 2:00 PM 53 IMMUNOPRECIPITATION OF ALBUMIN TO ENHANCE EVALUATION OF PROTEINS FROM HUMAN PERITONEAL DIALYSIS FLUIDS. P.E. Denny and M.A. Jones, Illinois State University, Normal and J.T. Hjelle, University of Illinois Medical School, Peoria.
- 2:15 PM 54 EVALUATION OF RABBIT LIVER MITOCHONDRIA FOR COPROPORPHYRINOGEN OXIDASE ACTIVITY. C. Zhen, T.D. Lash and M.A. Jones, Illinois State University, Normal.
- 2:30 PM 55 USE OF SDS-POLYACRYLAMIDE GEL ELECTROPHORESIS TO EVALUATE AFFINITY COLUMN PURIFICATION OF COPROPORPHYRINOGEN OXIDASE. T. Hall, T.D. Lash and M.A. Jones, Illinois State University, Normal.

- 3:00 PM 56 PARTIAL PURIFICATION OF RABBIT LIVER COPROPORPHYRINOGEN OXIDASE BY AFFINITY CHROMATOGRAPHY. E.P. Jiano, M.A. Jones and T.D. Lash, Illinois State University, Normal.
- 3:15 PM BREAK
- 3:30 PM 57 SYNTHESIS AND PURIFICATION OF OXAZOLIDINE NITROXIDES. Brian Pele and Philip D. Morse, II, Illinois State University, Normal.
- 3:45 PM 58 TEMPOL ADVERSLY AFFECTS T LYMPHOCYTE PROLIFERATION IN BALB C SPLEEN CELL CULTURES BY REDUCING CELL VIABILITY. John R. Bobell and Philip D. Morse, II Illinois State University, Normal.
- 4:00 PM 59 REDUCTION OF THE NITROXIDE TEMPOL BY MOUSE BLOOD. Andrea M. Weise, John Bobell and Philip D. Morse, II, Illinois State University, Normal.
- 4:15 PM DIVISION BUSINESS MEETING and BAXTER AWARD

COMPUTER SCIENCE DIVISION

DIVISION CHAIR:
 Lee H. Tichenor
 Department of Computer Science
 Western Illinois University
 Macomb. IL 61455

HEALTH & SCIENCES BLDG.
ROOM: 151

SESSION I - Friday, October 16

PRESIDING: Lee Tichenor

- | <u>TIME</u> | <u>PAPER #</u> | |
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| 1:30 PM | 60 | PLANET: A NETWORK PLANNING PROGRAM.
<u>Charles E. Neblock</u> , Western Illinois University, Macomb. |
| 1:45 PM | 61 | THE CASHLESS SOCIETY. <u>C. Pilks</u> and <u>L. Leff</u> , Western Illinois University, Macomb. |
| 2:00 PM | 62 | SYMBOLIC MATH CONSTRUCTIVE SOLID GEOMETRY (CSG) SYSTEM. <u>T. Trias</u> , <u>D. Thompson</u> , <u>L. Leff</u> , and <u>Z. Malik</u> , Western Illinois University, Macomb. |

- 2:15 PM 63 TWO PROGRAMS FOR SCHEDULING POLICE OFFICERS. B. Jones, W. Pittenger, Laurence L. Leff, R. Reinertsen and Michael H. Hazlett, Western Illinois University, Macomb.
- 2:30 PM 64 SOME COMPUTER RESULTS ON THE ARITHMETICS OF CAYLEY'S ALGEBRA. Patrick Lamont, Western Illinois University, Macomb.
- 2:45 PM BREAK
- 3:00 PM 65 THE HYPERTEXT-BASED EXECUTIVE INFORMATION SYSTEM. V. Ratnaprasad, C. Amaravadi and L. Leff, Western Illinois University, Macomb.
- 3:15 PM 66 SYMBOLIC FINITE ELEMENT ANALYSIS SYSTEM. M. Kyaw and L. Leff, Western Illinois University, Macomb.
- 3:30 PM 67 A BRIDAL SHOP EXPERT SYSTEM. S. Buasai and L. Leff, Western Illinois University, Macomb.
- 3:45 PM 68 THE EVOLVING GAS STATION, A GPSSH EXAMPLE FOR A SIMULATION COURSE. L.H. Tichenor, Western Illinois University, Macomb.
- 4:00 PM DIVISION BUSINESS MEETING

EARTH SCIENCE DIVISION

DIVISION CHAIR:
 Richard L. Leary
 Department of Geology
 Illinois State Museum
 Springfield, IL 62703

HEALTH & SCIENCES BLDG.
ROOM: 235

SESSION I - Friday, October 16

PRESIDING: Richard Leary

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9:10 AM INTRODUCTION

- 9:15 AM 69 COMPARISON OF THE PENNSYLVANIAN EURAMERICAN FOSSIL PLANT LESLEYA WITH THE PERMIAN GLOSSOPTERIS OF SOUTH AMERICA. Richard L. Leary, Illinois State Museum, Springfield.
- 9:30 AM 70 A MEGAFUNA FROM THE BOSKYDELL SANDSTONE (MORROWAN) IN SOUTHWESTERN ILLINOIS. G.H. Fraunfelter, Southern Illinois University, Carbondale.
- 9:45 AM 71 OBSERVATIONS ON AIRBORNE PARTICULATES IN RURAL ILLINOIS: 1985-1990. V. Gutowski and D. Osterman, Eastern Illinois University, Charleston.
- 10:00 AM 72 THE MARENGO METEORITE: THE SEVENTH DISCOVERED IN ILLINOIS. P.P. Sipiara, Schmitt Meteorite Research Group, Harper College, Palatine and E.J. Olsen, University of Chicago, Chicago.
- 10:15 AM DIVISION BUSINESS MEETING

ENVIRONMENTAL SCIENCE DIVISION

DIVISION CHAIR:
 Karen S. Midden
 Department of Plant and Soil Sciences
 Southern Illinois University
 Carbondale, IL 62901

BROOKENS LIBRARY
ROOM: 411

SESSION I - Friday, October 16

PRESIDING: Karen Midden

- | <u>TIME</u> | <u>PAPER #</u> | |
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| 2:00 PM | 73 | WHERE DOES FOOD COME FROM. <u>C.J. Midden</u> and <u>K.L.S. Midden</u> , Southern Illinois University, Carbondale. |
| 2:15 PM | 74 | A VERSATILE FLOW MODEL FOR RIVERINE AQUATIC HABITAT ASSESSMENT. <u>K.P. Singh</u> and <u>S.A. McConkey</u> , Illinois State Water Survey, Champaign. |

- 2:30 PM 75 A LONG-TERM ELECTROFISHING SURVEY SHOWS EVIDENCE FOR IMPROVED CONDITIONS ON THE UPPER ILLINOIS WATERWAY. T.V. Lerczak, R.E. Sparks and K.D. Blodgett, Illinois Natural History Survey, Havana.
- 2:45 PM 76 EFFECTS OF GAS PIPELINE RIGHT-OF-WAY VEGETATION ON A POORLY DRAINED DECIDUOUS FOREST EDGE IN MIDLAND COUNTY, MICHIGAN: A DESCRIPTION OF THE OVERSTORY COMPONENT. J.R. Rastorfer and J.A. Clemente, Chicago State University, Chicago, G.D. Van Dyke, Trinity Christian College, Palos Heights, and S.D. Zellmer, Argonne National Laboratory, Argonne.
- 3:00 PM 77 CAN ORGANIC MATTER ENHANCE THE NATURAL RECOVERY OF ACID MINE DRAINAGE CONTAMINATED LAKES? R. Govindacharyula and R. Brugam, Southern Illinois University, Edwardsville.
- 3:15 PM 78 MANAGED LEVEE FLOOD STORAGE FOR ENHANCING FLOOD PROTECTION, WETLANDS, AND RECREATION. Krishan P. Singh and H. Vernon Knapp, Illinois State Water Survey, Champaign.
- 3:30 PM DIVISION BUSINESS MEETING

HEALTH SCIENCES DIVISION

DIVISION CHAIR:
 Carol B. Lewandowski
 PCRPS - Rm. 310
 University of Illinois
 Chicago, IL 60612

HEALTH & SCIENCES BLDG.
ROOM: 151

SESSION I - Saturday, October 17 PRESIDING: Carol Lewandowski

TIME PAPER #

- 9:00 AM 79 ENHANCEMENT OF IMMUNE FUNCTION IN MICE BY SPECTINOMYCIN AND OTHER ANTIBACTERIAL ANTIBIOTICS. C.W. Wilson and D.J. Kitz, Southern Illinois University, Edwardsville

- 9:15 AM 80 EFFECTS OF ANTIFUNGAL AGENTS ON MURINE IMMUNE RESPONSE. D.J. Kitz, Southern Illinois University, Edwardsville.
- 9:30 AM 81 EFFECT OF TYROSINE KINASE INHIBITORS ON SECOND MESSENGER GENERATION. G. Nasello, S. Karimpour and P. Wanda, Southern Illinois University, Edwardsville.
- 10:00 AM 82 ISOLATION OF TETRAHYDROBERBERINE: SAM N-METHYLTRANSFERASE FROM ELICITED SUSPENSION CULTURES OF SANGUINARIA CANADENSIS L. B. O'Keefe, P.W. Morris and C.Wm.W. Beecher, University of Illinois, Chicago.
- 10:15 AM DIVISION BUSINESS MEETING

MICROBIOLOGY DIVISION

DIVISION CHAIR:
Amrik S. Dhaliwal
Department of Biology
Loyola University
Chicago, IL 60626

HEALTH & SCIENCES BLDG.
ROOM: 151

SESSION I - Friday, October 16

PRESIDING: Amrik Dhaliwal

- | <u>TIME</u> | <u>PAPER #</u> | |
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| 9:30 AM | 83 | THE INHIBITORY PROPERTY OF ZINGIBER OFFICINALE ON THE REPLICATION OF CYANOPHAGE LPP-1. <u>Lisa Y. Lee</u> and <u>Amrik S. Dhaliwal</u> , Loyola University, Chicago. |
| 9:45 AM | 84 | SCANNING ELECTRON MICROSCOPY OF CYANOBACTERIA TREATED WITH ZINGIBER OFFICINALE FRACTIONS SEPARATED THROUGH SEPHADEX COLUMN. <u>Humayra Ali</u> and <u>Amrik S. Dhaliwal</u> , Loyola University, Chicago. |
| 10:00 AM | 85 | INFECTIVITY STUDIES OF TOBACCO MOSAIC VIRUS TREATED WITH FRACTIONS OF THE EXTRACT OF <u>ALLIUM CEPA</u> SEPARATED THROUGH COLUMN CHROMATOGRAPHY. <u>Sung Shim</u> , <u>Amrik S. Dhaliwal</u> and <u>Sanjeev Mohan</u> , Loyola University, Chicago. |

10:15 AM 86 A NOVEL BIOASSAY FOR TOXICITY ASSESSMENT.
B. Hoffman and G. Elseth, Bradley
 University, Peoria.

10:30 AM DIVISION BUSINESS MEETING

SCIENCE, MATHEMATICS AND TECHNOLOGY EDUCATION

DIVISION CHAIR:
 Robert N. Woll
 N. Woll & Company
 P.O. Box 77
 San Jose, IL 62682

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SESSION I - Friday, October 16

PRESIDING: Robert Woll

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1:50 PM	88	WRITING ACROSS THE CURRICULUM - HOW TO SURVIVE WRITING ASSIGNMENTS FOR LARGE SCIENCE CLASSES. <u>J.E. Thomerson</u> , Southern Illinois University, Edwardsville.
2:10 PM	89	THE USE OF A COMPUTER AS A PLANT BREEDER IN THE TEACHING OF GENETICS. <u>Lawrence C. Matten</u> , Southern Illinois University, Carbondale.
2:30 PM	90	THE TASK IS LARGE, THE TIME IS SHORT: NURTURING AN APPRECIATION OF SCIENCE THROUGH AN HISTORICAL APPROACH. <u>R. Troll</u> , Augustana College, Rock Island.
2:45 PM	91	AN EASY AND INEXPENSIVE HANDS-ON INVESTIGATION ON ENERGY RELATIONS DURING BIOLOGICAL SUCCESSION. <u>W.J. Sundberg</u> , Southern Illinois University, Carbondale.
3:05 PM	92	THE ILLINOIS STATE MUSEUM'S INTERDISCIPLINARY SCIENTIFIC LITERACY WORKSHOPS FOR ELEMENTARY TEACHERS. <u>B.W. Styles</u> , Illinois State Museum, Springfield

- 3:20 PM 93 MATHEMATICAL LITERACY MEANS MANY DIFFERENT THINGS. Richard J. Maher, Loyola University, Chicago.
- 3:40 PM 94 A CROSS CULTURAL COMMUNICATION MODEL FOR MULTI-CULTURAL SCHOOLS. R.N. Woll, N. Woll and Company, Inc., San Jose.
- 4:00 PM DIVISION BUSINESS MEETING

ZOOLOGY DIVISION

DIVISION CHAIR:
Dianne Jedlicka
Department of Biological Sciences
University of Illinois
Chicago, IL 60680

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SESSION I - Friday, October 16

PRESIDING: Dianne Jedlicka

- | <u>TIME</u> | <u>PAPER #</u> | |
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| 1:30 PM | 95 | EVIDENCE FOR DEFICIENT ACTIVITY OF ADRENAL STEROIDOGENIC ENZYMES IN MUTANT CREAM (e/e) SYRIAN HAMSTERS. <u>A.G. Amador</u> , Southern Illinois University, Springfield, and <u>M. Levin</u> and <u>U.W. Huck</u> , Sangamon State University, Springfield. |
| 1:45 PM | 96 | EVIDENCE FOR DEFICIENT ACTIVITY OF TESTICULAR STEROIDOGENIC ENZYMES IN MUTANT CREAM (e/e) SYRIAN HAMSTERS. <u>A.G. Amador</u> , Southern Illinois University, Springfield, and <u>M. Levin</u> , <u>U.W. Huck</u> and <u>N. Angel</u> , Sangamon State University, Springfield. |
| 2:00 PM | 97 | PAEDOMORPHIC CHARACTERS AND THEIR EFFECT ON PHYLOGENETIC ANALYSES. <u>T.C. Grande</u> , Field Museum of Natural History, Chicago. |
| 2:15 PM | 98 | ZOOPLANKTON POPULATION DYNAMICS IN TWO ACID (pH-3.0) SURFACE MINE LAKES. <u>T. Reilly</u> and <u>R. Brugam</u> , Southern Illinois University, Edwardsville. |
| 2:30 PM | 99 | COMPETITIVE EXCLUSION IN SPECIES GROUP <u>THORACICA</u> OF THE GENUS <u>TRIPLEX</u> (COLEOPTERA EROTYLIDAE). <u>M.A. Goodrich</u> , Eastern Illinois University, Charleston. |

- 2:45 PM BREAK
- 3:00 PM 100 A FAUNAL STUDY OF THE GENUS OXYPORUS (COLEOPTERA: STAPHYLINIDAE: OXYPORINAE) IN ILLINOIS. R.S. Hanley and M.A. Goodrich, Eastern Illinois University, Charleston.
- 3:15 PM 101 MECHANISMS OF AGGREGATION IN THE IMPORTED WILLOW LEAF BEETLE. M.L. Crowe, Northern Illinois University, DeKalb.
- 3:30 PM 102 MATURATION-RELATED DECREASE OF STEROID LEVELS IN THE ADRENALS OF MALE WOODCHUCKS (*Marmota monax*). A.G. Amador, Southern Illinois University, Springfield, and A. Woolf, Southern Illinois University, Carbondale.
- 3:45 PM 103 EVIDENCE DOSE- AND TIME-DEPENDENT REGULATION OF TESTICULAR ESTRADIOL METABOLISM BY hCG. A.G. Amador, Southern Illinois University, Springfield, and A. Mayerhofer, Universitaet Ulm, Germany.
- 4:00 PM 104 EVIDENCE FOR SPECIES-SPECIFIC REGULATION OF TESTICULAR ESTRADIOL METABOLISM BY hCG. A.G. Amador, Southern Illinois University, Springfield, and A. Mayerhofer, Universitaet Ulm, Germany.
- 4:15 PM DIVISION BUSINESS MEETING

SESSION II - Saturday, October 17 PRESIDING: Dianne Jedlicka

1:00 PM SPECIAL NOTE #1
TOUR with J. Rick Purdue, the Illinois State Museum Research/Collection Center. (Sign up sheet at Registration Desk.)

LATE AFTERNOON SPECIAL NOTE #2
Zoology Section is invited to visit the Henson Robinson Zoo in Springfield.

POSTER SESSION

Friday, October 16
5:30 PM - 7:15 PM

Illinois State Museum
Arts and Sciences Gallery

POSTER

- 105 INTERACTION OF THIDIAZURON WITH OTHER CYTOKININS IN RELATION TO THE REGENERATION OF AMERICAN ELMS FROM LEAF TISSUES. P.A. Herman and M.G. Bolyard, Southern Illinois University, Edwardsville.
- 106 EFFECTS OF ETHYLENE ON ONION BULB LEAF BASE EPIDERMAL NUCLEAR AND NUCLEOLAR MACROMOLECULES. P.K. Bhattacharya, Indiana University Northwest, Gary, Indiana, and C.S. Karagiannis and A.J. Pappelis, Southern Illinois University, Carbondale.
- 107 OPTIMAL IN VITRO CONDITIONS FOR RAT COAGULATING GLAND TRANSGLUTAMINASE (CGTGASE). R.E. Beil and B.L. Johnson, Chicago State University, Chicago.
- 108 GEOLOGY OF THE WALTERSBURG 7 1/2' QUADRANGLE, POPE COUNTY, ILLINOIS. C.P. Weibel, Illinois State Geological Survey, Champaign.
- 109 QUESTIONNAIRING UNIVERSITY STUDENTS IN BIOLOGY ON EMERGENCE AND EVOLUTION OF LIFE. Aristotel Pappelis and Sidney W. Fox, Southern Illinois University, Carbondale.
- 110 OUTCOMES OF A CONFERENCE FOR ILLINOIS TEACHER-LEADERS IN MATHEMATICS, SCIENCE, AND TECHNOLOGY EDUCATION. W.J. Sundberg, Southern Illinois University, Carbondale.
- 111 "MAMMALSTACK": AN INTERACTIVE MAMMALOGY STUDY GUIDE FOR MACINTOSH COMPUTERS. J.O. Humphrey and G.A. Feldhamer, Southern Illinois University, Carbondale.
- 112 GRAND CANYON RATTLESNAKE (CROTALUS VIRIDIS ABYSSUS) COMPARISON OF ENZYMATIC VARIABILITY WITH OTHER CROTALUS VIRIDIS SUBSPECIES. S.R. Vogt and D.M. Miller, Southern Illinois University, Carbondale.
- 113 ENVIRONMENTAL PRESSURES AND THE OPTIMAL FORAGING THEORY. J.L. Kriz and D.M. Jedlicka, Joliet Junior College, Joliet and University of Illinois, Chicago.

114 SEASONAL DIFFERENCES IN CENTRAL PLACE FORAGING OF
TWO SCIURID RODENTS. D.M. Jedlicka, University of
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ABSTRACTS

1

ECONOMICAL UTILIZATION OF ETHANOL BY-PRODUCTS. P. L. Harms, P.R. Eberle, and A. W. Young. Southern Illinois University, Carbondale, IL 62901. Ethanol is currently being produced from corn and is being offered as an alternative energy source. In the dry milling process, one bushel of corn produces 2.5 gallons of ethanol as well as 18 pounds of distiller's dried grains (DDG) and solubles, which are referred to as by-products. Effective utilization of these by-products can enhance ethanol's economic feasibility. The objective of this paper is to determine the highest value that can be placed on DDG to aid in offsetting the cost of ethanol production. Preliminary results indicate a value of six to eight cents per pound for DDG when used for feedlot cattle. This equates to a reduction of forty-three to fifty-eight cents per gallon towards the production of ethanol.

2

AN EVALUATION OF ILLINOIS FARMER'S ATTITUDES ON SUSTAINABLE AGRICULTURE. J.A. Chmiola and P.R. Eberle, Southern Illinois University, Carbondale, IL 62901. This study surveyed a sample of Illinois Farmers with the objective to determine their attitudes towards sustainable agricultural practices. Sustainable agricultural practices were defined as a set of soil conservation, soil fertility, residue management, and pesticide management practices which reduce the harmful effects of agriculture on the environment while maintaining farm profits. Several hypotheses were considered in the study. Two of the hypotheses were (1) young-farmers are more likely to perceive farmers as adopting sustainable agricultural practices and (2) farmers with a higher education level are more likely to perceive farmers as adopting sustainable agricultural practices. The results of a survey of 1530 Illinois Farmers with a 33% response showed no significant difference of opinion based on a farmer's age or education level. Illinois farmers overall agree or strongly agree that farmers are adopting sustainable agricultural practices.

3

FARMER ATTITUDES TOWARDS ALTERNATIVE POLICIES TO CONTROL THE AGRICULTURAL CONTAMINATION OF GROUNDWATER. S. Steinback, C. Lant, and S. Kraft, Southern Illinois University, Carbondale, IL 62901. Groundwater is an important source of drinking water in Illinois and in the United States. Currently, policy makers are evaluating both voluntary and regulatory approaches to controlling the contamination of groundwater by farming activities. A survey was conducted to determine the attitudes of farmers over aquifers to different policies. By zipcode, farmers were selected to be surveyed in those areas over aquifers. The survey results indicate that farmers are aware of the problem but prefer voluntary approaches to solving the problem.

REACTIONS OF STUDENTS TO ENVIRONMENTAL PROBLEMS: USE OF THE NEW ENVIRONMENTAL PARADIGM. T. F. Kraft and S. E. Kraft, Southern Illinois University, Carbondale, IL 62901. A sample of students from junior high school, high school, and university were surveyed regarding their environmental attitudes and behavior. A number of environmental issues were studied including groundwater, soil erosion, and air quality. The students' concerns about these issues was highly related to their environmental index derived from the questions of the New Environmental Paradigm. The importance of these relationships is explored.

REINTRODUCTION OF RUBBER AS AN AGRICULTURAL EXPORT FOR BRAZIL.

R. N. Woll, N. Woll and Company, Inc., San Jose, IL 62682-0077.

Early in this century Brazil had a position as a leading exporter of natural rubber. This position eroded as Malaysia and other areas came into production with higher yields. Another factor effecting the Brazilian production was a fungus which attacked the leaves and killed the rubber trees. Recently there is a trend to reactivate Brazil as a major rubber producer utilizing the high Cerrado Plains rather than Amazonia. This paper describes research and development efforts presently occurring which are key to this effort.

EFFECTS OF GAS PIPELINE RIGHT-OF-WAY VEGETATION ON A POORLY DRAINED DECIDUOUS FOREST EDGE IN MIDLAND COUNTY, MICHIGAN: FERNS, NOTABLE COMPONENTS OF THE UNDERSTORY. *J.R. Rastorfer, Chicago State University, Chicago, IL 60628; J.E. Frelichowski, University of Illinois, Urbana, IL 61801; G.D. Van Dyke, Trinity Christian College, Palos Heights, IL 60463; and S.D. Zellmer, Argonne National Laboratory, Argonne, IL 60439. Two sites in Midland County, Michigan, were established in 1989 to document the development of plant communities on a gas pipeline right-of-way (ROW) and any compositional changes within adjacent forest communities that might be caused by ROW construction activities and plant communities of the ROW. Although the forested portions of both sites represent second growth, Site 1 had evidence of recent selective logging, whereas Site 2 had no marked evidence of logging for at least 50 years prior to 1989. Seven species of ferns occurred in Site 1, and four of the same species occurred in Site 2. *Onoclea sensibilis* and *Pteridium aquilinum* were the most conspicuous taxa, but their distributions were different. *Onoclea sensibilis* was the most abundant fern in the forests of both sites and a major component of the herbaceous layer. Its three-year average coverages for transects at 5, 13, and 41 m north of the ROW's edge were 44%, 42%, and 7.2% for Site 1 and 15%, 22%, and 21% for Site 2. *Pteridium aquilinum* was more important in Site 1 than in Site 2. Its three-year average coverages for the same transects were 8.9%, 16%, and 20% for Site 1 and 0.61%, 0.12%, and 0.02% for Site 2. Although the ROW was essentially devoid of vegetation following the installation of the gas pipeline, new shoots of *Onoclea sensibilis* have appeared on the ROW from rhizomic fragments and probably spores.

*Work supported by Gas Research Institute, 8600 W. Bryn Mawr Avenue, Chicago, IL 60631.

ALGAL POPULATION DYNAMICS IN TWO ACID (pH=3.0) SURFACE MINE LAKES FROM SOUTHERN ILLINOIS J. Watral and R. Brugam, Southern Illinois University, Edwardsville, IL 62026.

Algal samples were taken at approximately bi-weekly intervals for a year from two acid surface mine lakes and examined. Organic matter is being added to one lake as a test of organic loading as a neutralizing agent. These additions have not yet changed the phytoplankton composition of the experimental lake because of continuing contamination by acid mine drainage. Both lakes are dominated by species of Chlamydomonas and Cryptomonas and little else.

MEGAFOSSIL FLORA FROM THE UPPERMOST DEVONIAN OF HOOK HEAD, COUNTY WEXFORD, IRELAND. Lawrence C. Matten, Southern Illinois University at Carbondale, Carbondale, IL 62901. The Hook Head peninsula, on the east side of Waterford Harbor, exhibits a continuous sequence of strata along its coastline from the Devonian Templetown Conglomerate (in the north) to the Carboniferous Hook Head limestone (in the south). Localities on both east and west coasts yield compressions and petrifications. These localities lie within the Harrylock formation (equivalent to the Scout's Hiding Place member of the West Cork Sandstone formation). Meiospores from these localities indicate a range in age from the LL subzone to the LE subzone of the PL spore zone (basal Tn1a to basal Tn1b). Thus the megafossil localities occur below the accepted Devonian-Carboniferous boundary in Ireland. To date, the megafossil flora consists of at least six elements with *Archaeopteris hibernica* (compressions and a single petrification of a rachis) and *Cf. Pitus* occurring most frequently. Compressions include: *Archaeopteris hibernica*, *Cf. Barinophyton*, *Cf. Cyclostigma*, and stem casts. Petrifications include: *Archaeopteris*, *Wexfordia*, gymnospermous wood, *Cf. Pitus*, and a gymnospermous root. Although similar in age to the Ballyheigue flora, the Hook Head flora appears to be most similar to the Kiltorcan flora which is dominated by *Archaeopteris* and *Cyclostigma*.

TESTING THE RESPONSE OF THREE LITTLE BLUESTEM (SCHIZACHYRIUM SCOPARIUM) POPULATIONS TO MYCORRHIZAL FUNGAL INNOCULUM FROM A SINGLE SOURCE. R.C. Anderson and K.J. Roberts, Illinois State University, Normal, IL 61761. In prairie restoration, the use of seeds from non-local sources has been of concern to restorationists. In this study, the specificity between mycorrhizal fungi and little bluestem from three different sources was examined. Seed for this experiment was obtained from three sources (1) a commercial seed source in Kansas, (2) Sand Ridge State Forest (SRSF), Mason County, Illinois, and Sand Prairie Scrub Oak Nature Preserve (SPSO), 32 km southwest of SRSF. Plants were grown in three substrates (1) autoclaved soil, (2) autoclaved soil to which a mycorrhizal fungal free sieving of nonautoclaved soil was added, and (3) nonautoclaved soil. All plants grown in the nonautoclaved soil were colonized by mycorrhizal fungi, whereas none of those grown in the other substrates were colonized. Plants grown from Sandridge seed produced more biomass than those grown from Sand Prairie or Kansas seed (mean + SE, Sandridge = 0.54 ± 0.04 g, SPSO = 0.49 ± 0.03 g, Kansas = 0.37 ± 0.03 g). For plants from all sources, those grown in nonautoclaved soil (0.27 ± 0.02 g) produced less biomass than plants grown in autoclaved (0.58 ± 0.03 g), or autoclaved plus sievings (0.59 ± 0.03 g). The results provide no indication of a host-endophyte specificity.

INFLUENCE OF VARIED LEVELS OF IRRADIANCE ON THE GROWTH AND PHOTOSYNTHETIC RATES OF GARLIC MUSTARD (*Alliaria petiolata*). I. M. Kelley and R. C. Anderson, Illinois State University, Normal, IL 61761, and S. S. Dhillon, Texas Tech University, Lubbock, TX 79409-3131. Garlic mustard (*Alliaria petiolata*), an exotic herbaceous plant species which is aggressively invading woodlands in Illinois and displacing the native understory flora, typically grows beneath forest canopies displaying a wide range of irradiance conditions. To determine plant response to varied levels of irradiance, garlic mustard seedlings were grown in a growth chamber under zero, one, two, or three layers of polypropylene shade cloth, corresponding to 1,140, 469, 243, and 125 $\mu\text{E}/\text{m}^2/\text{s}$ PAR (Photosynthetically Active Radiation), respectively. Biomass production declined as the level of radiation under which the plants were grown decreased. Photosynthetic and stomatal conductance rates were measured for plants grown in: (1) a growth chamber under the four described irradiance regimes, (2) a garden site receiving nearly-full sunlight (81%), and (3) a partially shaded forest opening. Growth chamber-grown plants exhibited the highest photosynthetic rates under irradiance levels comparable to those under which they were grown. Stomatal conductance rates for these plants followed the same pattern as photosynthetic rates under the varied levels of PAR, while plants grown in the garden site exhibited extremely low photosynthetic and stomatal conductance rates at low radiation levels. Forest-grown plants exhibited maximal photosynthetic and stomatal conductance rates at low irradiance levels (200 - 800 $\mu\text{E}/\text{m}^2/\text{s}$). Conversely, only garden-grown plants attained maximum photosynthetic rates under full sunlight conditions (1,790 $\mu\text{E}/\text{m}^2/\text{s}$).

NUCLEIC ACID, PROTEIN, AND NUCLEAR AND NUCLEOLAR VOLUME PATTERNS IN HAIR CELLS OF THE YOUNG AND SENESCING MAY APPLE LEAF. P.K. Bhattacharya, Indiana University Northwest, Gary, IN 46408, and A.J. Pappelis, Southern Illinois University, Carbondale, IL 62901. Nuclear and nucleolar volumes, and four nuclear macromolecular indices [DNA, RNA, histone (HP), and non-histone protein (nHP); by quantitative epifluorescence microscopy] were determined 7 times over 40 days (D) in May Apple (*Podophyllum peltatum*) marginal leaf hairs (single cells). First measurements (3 replications) on expanding leaves were set at 100%. Nuclear and nucleolar volumes declined rapidly (D 7, 14, and 40, nuclear = 64, 52, and 24%; nucleolar = 47, 34, 11%). DNA, RNA, HP, and nHP also declined (amounts for D 14, 28, 40 were: DNA = 85, 68, and 40%; RNA = 86, 47, and 20%; HP = 77, 61 and 41%; and nHP = 48, 20, and 13%). On D 40, yellowing was evident on some leaves. We infer that these hair cells are excellent for the study of programmed cellular senescence in plants.

THE GREEN WING ENVIRONMENTAL LABORATORY: A NEW FIELD STATION IN NORTHERN ILLINOIS. B. Dziadyk, Augustana College, Rock Island, IL 61201-2296. In December 1991, Augustana College purchased the Green Wing Bible Camp from the Evangelical Lutheran Church in America. The 170ha site is located 5km southeast of Amboy in Lee County. The middle of the property is characterized by an 8ha cattail marsh with adjacent sedge meadows. Uplands are dominated by oak and some pine forests. Several formerly cultivated plots on the property will be used for projects in restoration ecology, especially for prairie restoration. A diverse fauna of vertebrate and invertebrate species is present. Current research is focused on floristic composition of the ecological communities. Long-term objectives emphasize preservation, research and, where necessary, restoration of this diverse remnant of northern Illinois.

CYTOFLUOROMETRIC QUANTITATION OF THE NUCLEAR DNA IN STAMINAL HAIR CELLS OF TRADESCANTIA, AND OXAMYL EFFECT. P.K. Bhattacharya, Indiana University Northwest, Gary, IN 46408; W.K.L. Lee and A.J. Pappelis, Southern Illinois University, Carbondale, IL 62901. DNA (determined by quantitative epi-fluorescence microscopy) and nuclear volume increased in Tradescantia clone 4430 stamen hairs from meristematic apical to basal cells (about 33 cells in length). The DNA and nuclear volume in three apical cells of normal plants were set as 100%: nuclei in three central cells contained 33% more DNA and were 93% greater in volume; and, the three basal cells contained 39% more DNA and were 144% greater in volume. One day after treatment with oxamyl, DNA and nuclear volumes were like those in controls. However, after 15 days, oxamyl treated plants varied in the apical locations (15-day controls, DNA = 5% and nuclear volume = 26% greater; 15-day oxamyl treated plants DNA = 39% and nuclear volume 32% greater) but central and basal cells did not. Oxamyl acts as a mitotic poison in Aspergillus niger and induces abnormal stamen hair growth in Tradescantia clone 4430. We infer that oxamyl interferes with cell cycle activities (replication and/or mitosis) in Tradescantia stamen hair meristematic cells.

GERMINATION AND BOLTING IN BOLTONIA DECURRENS GROWN FROM MORPHOLOGICALLY DIFFERENT SEED TYPES. S. Musholt and M. Smith, Southern Illinois University at Edwardsville, IL 62026-1651. Boltonia decurrens, an endangered member of the aster family, produces two types of seeds, disc and ray. This study was conducted to compare the germination and bolting patterns of plants originating from the two seed types. Both seed types were germinated under identical conditions, with and without prior cold treatment. No statistically significant difference in germination or bolting occurs between plants originating from the different seed types.

EFFECTS OF SOIL MOISTURE AND NUTRIENT STATUS ON GERMINATION AND GROWTH OF BOLTONIA DECURRENS. Shawn Turner and Marian Smith, Southern Illinois University at Edwardsville, IL 62026-1651. Boltonia decurrens, a member of the Asteraceae, is on the Federal list of threatened species, mainly due to major changes in flood patterns in the Illinois River floodplain. The present study had two objectives: 1. to determine the effect of spring flooding on seed germination; and 2. to determine the possible effect on seedling growth of an annual replenishment of soil nutrients by floodwaters. Seeds germinated better on standing water when compared to moist or dry soil surfaces; and seedling growth rate and biomass were higher on soil with a nutrient flush.

EFFECTS OF SOIL TYPE ON THE COMPETITION AND BIOMASS PRODUCTION OF BOLTONIA DECURRENS ROSETTES WHEN GROWN INTRASPECIFICALLY AND WITH BOLTONIA ASTEROIDES. E. D. Melton III and M. Smith, Southern Illinois University at Edwardsville, IL 62026-1651. Boltonia decurrens, a member of the Aster family, is in danger of becoming extinct due to an increase in industrial and agricultural activity in Illinois. To aid in the formulation of a recovery plan for B. decurrens, a broad study of the basic biology and ecology of the life cycle of this species was initiated by the U.S. Army Corps of Engineers in 1989. This experiment was done as a part of the overall study. Rosettes of B. decurrens and B. asteroides were grown in monoculture, intraspecifically, and interspecifically on two different soil types, loamy sand and clay. We hypothesized that B. decurrens would produce more biomass and compete better than B. asteroides on loamy sand than on clay. We found that B. decurrens produced more biomass than B. asteroides in both soil types and in all competitive cases.

POPULATION STUDY OF BOLTONIA DECURRENS, A FEDERALLY THREATENED PLANT SPECIES. Anjela Reynolds and Marian Smith, Southern Illinois University at Edwardsville, IL 62026. Boltonia decurrens is a perennial, early successional species that is found in disturbed, lowland areas. The purpose of this study was to gain insight as to the conditions required by B. decurrens for survival in natural populations. Vegetative reproduction in the form of basal rosettes, seedling survival, seed rain, and soil seed bank were studied. Results show that basal rosette survival was approximately 50 percent and seedling survival was 90 percent. Soil seed bank was very low compared to the seed production, and seed rain appears to be greatest in the areas with the highest density of plants.

CYTOFLUOROMETRIC STUDY OF SENESCING LEAF EPIDERMAL NUCLEI OF PODOPHYLLUM PELTATUM IN RESPONSE TO PUCCINIA PODOPHYLLI SCHW. P.K. Bhattacharya, Indiana University Northwest, Gary, IN 46408, and **A.J. Pappelis**, Southern Illinois University, Carbondale, IL, 62901. Nuclear and nucleolar volumes, and four nuclear macromolecular indices [DNA, RNA, histone (HP), and non-histone protein (nHP); by quantitative epifluorescence microscopy] were determined for nuclei of lower epidermal cells of May Apple (Podophyllum peltatum) in four contiguous color zones [central pustule = brownish yellow (BY); yellow (Y); yellow-green (YG); and green (normal)] beginning in the pustule site induced by Puccinia podophylli. The green zone data were set at 100%. Nuclear and nucleolar volumes were reduced to 55% in BY, 68% in Y, and 95% in YG zones. DNA was 70% in BY, 74% in Y, and 97% in YG. RNA was 58% in BY, 62% in Y, and 100% in YG. H was 75% in BY, 80% in Y, and 93% in YG. nHP was 55% in BY, 56% in Y, and 119% in YG. We infer that a gradient of host cell responses exists in this pathogen-induced lesion and it can be considered to be a model for fungal-induced cellular senescence (obligate fungal pathogens are generally excluded from such studies).

ILLINOIS SPECIES OF VOLVARIELLA (BASIDIOMYCETES, AGARICALES, PLUTEACEAE).
H. L. Monoson, Bradley University, Peoria, IL 61625, A. S. Methven, Eastern Illinois University, Charleston, IL 61920, and W. J. Sundberg, Southern Illinois University, Carbondale, IL 62901. In his monograph of Volvariella in North America, Shaffer reported only two species from Illinois, V. bombycina (Schaeff.: Fr.) Singer and V. speciosa (Fr.) Singer. Known only from Cook, DuPage, Henry, and Rock Island Counties, it appeared that Volvariella was rare in Illinois and restricted to the northern fifth of the state. A study of both additional herbarium material and collections made by us from other parts of the state support a broader distribution pattern and greater diversity of species. Although Volvariella speciosa still appears restricted to the northern part of Illinois, populations of V. bombycina range throughout the state. New records for Illinois include V. pusilla (Pers.: Fr.) Singer, V. taylori (Berk.) Singer, and V. cf. volvacea (Buff.: Fr.) Singer. Lack of previous reports of these taxa in the state may be due to the smaller size and more ephemeral nature of their basidiomata.

DISTRIBUTION OF EPIPHYTIC LICHEN COMMUNITIES ON SELECTED TREES IN EAST CENTRAL ILLINOIS. M.R. Thon and A.S. Methven, Eastern Illinois University, Charleston, IL 61920. A survey of epiphytic lichen communities occurring on selected trees at Walnut Point State Park (Douglas Co.), Fox Ridge State Park (Coles Co.), and Sam Parr State Park (Jasper Co.) was completed. Quantitative data on the distribution and abundance of epiphytic lichens was recorded and variation in species composition and distribution within these communities identified. Some edaphic factors which may account for the observed variation in species composition and distribution were also assessed.

CHANGES IN NUCLEAR PROTEINS, NUCLEIC ACIDS, AND NUCLEOLAR AND NUCLEAR VOLUMES IN EPIDERMAL NUCLEI OF ALLIUM CEPA FOLLOWING EXPOSURE TO AMBIENT ATMOSPHERE FOR VARIOUS TIME PERIODS. P.K. Bhattacharya, Indiana University Northwest, Gary, IN 46408; C. S. Karagiannis and A.J. Pappelis, Southern Illinois University, Carbondale, IL 62901. Nuclear and nucleolar volumes, and four nuclear macromolecular indices [DNA, RNA, histone (HP), and non-histone protein (nHP); by quantitative epifluorescence microscopy] were determined for nuclei of outer epidermal cells of turgid onion bulb leaf bases exposed to the ambient atmosphere. Samples were taken at time of exposure (T-0) and after 6, 12, 24, 48, 96, and 120 hours (T-120) of exposure. T-0 data were set at 100%. Nuclear and nucleolar volumes increased to T-48 and then decreased. DNA and HP remained constant from T-0 to T-48 and then declined about 15%. RNA and nHP increased from T-0 to T-24 (192 and 184% respectively) and then decrease (T-120; RNA = 35%, nHP = 47%). Minor nucleolar organizer regions were activated by T-24 and remained active at T-48. NOR activity declined thereafter and did not return to the starting (quiescent) level. We infer that the quiescent cells in the third turgid leaf base epidermis were activated by exposure to the atmosphere, remained activated for several days, and then began to senesce (like outermost bulb leaf bases).

THE MUSHROOM GENUS PLUTEUS (PLUTEACEAE, AGARICALES) IN ILLINOIS. P. Banerjee and W. J. Sundberg, Department of Plant Biology, Southern Illinois University at Carbondale, Carbondale, IL 62901. A study of the mushroom genus Pluteus, with an emphasis on section Pluteus, was carried out in Illinois during the past several years. At least fifteen species distributed among all three sections of the genus (section Pluteus, section Celluloderma, and section Hispidoderma) occur in the state. Nine taxa belong to section Pluteus. In that section, P. cervinus (Schaeff.: Fr.) Kumm. was the most frequently encountered species, followed by P. petasatus (Fr.) Gillet and P. patricius (Schulz. in Kalchbr.) Boud. in Sacc. Pluteus admirabilis (Pk.) Pk. and P. flavofulgineus Murr. were the most commonly found species in sections Celluloderma and Hispidoderma, respectively. In nature, basidiocarp occurrence was favored by a lignicolous habitat with a low pH (3.6-4.0); terrestrial fruitings were less common. Although no species specific mushroom-substrate association patterns were observed, Oak was the most frequent substrate. Several new state records and numerous new county records were documented. An identification key to North American species in section Pluteus of the genus Pluteus will be presented.

RELATIVE SENSITIVITIES OF DIATOMS TO SELECTED HEAVY METALS. J.E. Carlson and C.L. Pederson, Eastern Illinois University, Charleston, IL 61920. Diatom community structure as well as metal concentrations of water, sediments, and periphyton of the Embarras River drainage have been described. These baseline data were obtained for use in monitoring heavy metal pollution which may occur in conjunction with industrialization in the watershed. However, diatom community structure can only be useful as a biomonitor of heavy metals once relative sensitivities of dominant species and relative toxicities of metals have been determined. Accordingly, unialgal cultures of diatoms were isolated from various Embarras River substrata (e.g., mud, stones, twigs). Standard bioassay procedures were used to investigate the effects of various concentrations of selected metals (e.g., Cr, Ni, Zn) on population growth and survival.

POPULATION MEASUREMENT IN SELENASTRUM CAPRICORNUTUM. K. Havel and F. B. Kulfinski, Southern Illinois University, Edwardsville, IL 62026. Selenastrum was grown in Hornung and Webers medium for the purpose of using its growth curves in toxicological studies. It was considered necessary to determine whether absorbance readings measured spectrophotometrically constituted an appropriate estimate of number of cells per unit volume. Serial dilutions of a culture were made and each was quantified by use of (1) absorbance at 680 nm, (2) Coulter counts, and (3) microscope counts. The question of whether these three measurements were well correlated and also of whether the correlations were the same at different population densities was studied. Population size was quantified similarly (but in different units) by each of the three methods used. All three methods appear to be usable and this lab will likely continue to employ absorbance for population growth studies due to its simplicity of use.

USE OF POPULATION GROWTH CURVE DYNAMICS TO DETERMINE DEGREE OF TOXICITY OF COPPER TO ALGAE. R. Angelbeck and F. B. Kulfinski, Southern Illinois University, Edwardsville, IL 62026. Selenastrum capricornutum was grown in nutrient medium and population density was estimated by absorbance, using a spectrophotometer set at 680 nm. Verhulst-Pearl equations were used to determine r and K values. These values were plotted against copper concentration and EC_{50} was estimated. The EC_{50} value compared favorably with EC_{50} values found in the literature and determined by other means.

RESPONSE OF PRAIRIE/FOREST ECOTONAL SHRUBS TO FIRE. R. C. ANDERSON AND J. S. SCHWEGMAN, ILLINOIS STATE UNIV., NORMAL, IL 61761 AND DIVISION OF NATURAL HERITAGE, IDOC, SPRINGFIELD, IL 62701. Shrubs associated with savannas and barrens are often encouraged by prescribed burning, and disappear if trees invade a site following cessation of fire. For example, in a southern Illinois barren, 3 prescribed burns encouraged sprouting of prairie willow and silky dogwood, but stem densities of these species declined and the abundance of tree seedlings and saplings and Japanese honeysuckle increased following a 15-year period without fire. Removal of woody plants and reintroduction of fire increased the density of some shrubs, silky dogwood and American hazel and the species richness of shrubs increased. However, there was no evidence for recovery of prairie willow. These results suggest that using prescribed burning to maintain transitional vegetation types, which includes shrubs, will require varied fire frequency and careful attention to individual species responses to burning.

OXAMYL AND BENOMYL ACT AS MITOTIC POISONS IN TRADESCANTIA CLONE 4430 BUT NOT IN CLONE O2. Wilfred K. L. Lee, John C. Veremis, and A. J. Pappelis, Department of Plant Biology, Southern Illinois University, Carbondale, IL, 62901. Oxamyl (10% a.i.) and Benomyl (50% a.i.) induced stamen hair branching and micronuclei in Tradescantia clone 4430 but not in clone O2 in a dose response manner (Pro Mix BX plus carbamate in 6" pots with intact plants; 300 ml half-strength Hoagland's #2 solution plus carbamate plus aeration). Branching peaked in the third week of treatment. Micronuclei were in some cells at branch sites. Blue to pink mutations were not statistically greater than in controls of these clones. Aneuploidy has been induced by Benomyl in Aspergillus nidulans and we (Lee and Pappelis) found (with Dr. Etta Kafer) Oxamyl also induces the same condition. These carbamates were phytotoxic to clone 4430 (reduced flower production, inhibited adventitious root formation, induced bud blasting). This is the first report of induced stamen hair branching in the Tradescantia short-term test for mutagens and carcinogens.

FUNGI OF THE SAND PRAIRIE-SCRUB OAK NATURE PRESERVE, MASON CO, ILLINOIS. A.S. Methven, Eastern Illinois University, Charleston, IL 61920. Oak savannas are one of the more unique vascular plant communities found in the Sand Prairie-Scrub Oak Nature Preserve. The oak savannas feature shade intolerant trees such as black oak, blackjack oak, black hickory and mockernut hickory which thrive under xeric conditions in acidic, sandy soils. Despite the number of floristic and ecological studies completed on oak savannas in Illinois, there has been little effort to catalog the fungi which flourish in these communities. Twelve months of field work in the Sand Prairie-Scrub Oak Nature Preserve has led to the preparation of a preliminary inventory of the fungi found in association with black oak, blackjack oak, black hickory and mockernut hickory. Color slides of representative fungi from the inventory list will be presented along with notes on the presumed ecological role of these fungi in the maintenance and preservation of the oak savanna.

TEACHING ENVIRONMENTAL CONCEPTS: "ENDANGERED PLANTS", A VIDEO WITH SUPPLEMENTARY TEACHING MATERIALS FOR JUNIOR HIGH STUDENTS. M. Smith and M. Grant, Southern Illinois University at Edwardsville, IL 62026-1651 and University of Missouri-St. Louis, MO 63121-4499. One of a series funded by the Missouri Public School System, this video features an endangered Illinois River Floodplain species, Boltonia decurrens, to help students understand some of the effects of human disturbances upon plant and animal populations. A curriculum guide provides activities for teachers and students, enabling them to perform several simple techniques used by scientists to monitor plant reproduction and survival in natural populations.

PREPARATION OF AN IN VITRO TRANSLATION SYSTEM FROM BARLEY ALEURONE LYSATES. Tracy Pinkelton and Mark Brodl, Biology Department Knox College, Galesburg, IL 61401

When exposed to the phytohormone, gibberelic acid (GA_3) and elevated temperatures, barley aleurone cells exhibit a characteristic heat shock response, including the induction of a set of heat shock proteins. At the same time, the synthesis of secretory proteins is suppressed, and secretory protein mRNAs are destabilized. Ultrastructural analysis has shown that heat shock causes the dissociation of endoplasmic reticulum lamellae, and it has been hypothesized that the suppression of secretory protein synthesis is due to this change, which would specifically target secretory protein mRNA for destabilization. However, the suppression of secretory protein synthesis precedes significant degradation of the mRNAs, suggesting that there may be regulation initiated at the translational level as well. In order to investigate the mechanisms of this control, we have developed an *in vitro* translation system using barley aleurone lysates fractionated on sucrose density gradients. We will report on this method and on the translational efficiencies of lysates derived from heat-shocked and control cells as well as other manipulations (i.e., heat-shocked/recovered).

THE EFFECT OF HEAT SHOCK ON THE CYTOSKELETON OF BARLEY ALEURONE CELLS. Jennifer Lonsdale and Mark Brodl, Knox College, Galesburg, IL 61401

All organisms respond to heat shock (HS) by synthesizing a set of HS proteins. In aleurone cells, HS also results in the selective suppression of secretory protein synthesis and the dissociation of ER lamellae. The dissociation of the ER lamellae results in the loss of protein translation sites and could be key to the selectivity in protein suppression. Our laboratory is interested in the mechanisms for ER dissociation. The ER and the cytoskeleton are interdependent structures. Furthermore, it has been observed that in animal cells the cytoskeleton breaks down in response to HS. In plants, the effect of HS on the cytoskeleton is unknown. We have been using indirect immunofluorescence microscopy on paraformaldehyde-fixed cells that have had their cell walls partially digested by Onozuka Cellulase R-10. Cell wall digestion after fixation has been shown to preserve the natural conformation of the cytoskeleton (Wick *et al.*, *J. Cell Biol.* 89: 685). We have observed the cytoskeleton at normal temperatures and found a network of microtubules is present throughout the cell. After HS, the tubulin appears as condensed, bright, elongated regions of fluorescence-especially near the nucleus. This change in the cytoskeleton during HS may contribute to the dissociation of the ER. Currently, we are examining the effect of HS on the actin containing microfilaments using partial protoplasts and indirect immunofluorescence.

CATALYTIC HYDROGENATION AND THERMOPROTECTION IN BARLEY ALEURONE CELLS. Tim Filas and Mark R Brodl, Department of Biology, Knox College, Galesburg, IL 61401.

Heat shock (HS) in barley aleurone cells results in the selective suppression of secretory protein synthesis and the induction of heat shock proteins (hsps). The synthesis of non-secretory proteins continues during HS. We have observed that HS also causes the dissociation of ER lamellae and the destabilization of secretory protein mRNAs. Because secretory proteins are translated by ER-bound ribosomes this change in ultrastructure may serve as the mechanism for the selectivity of suppression of secretory proteins. We have also found that fatty acids associated with microsomal membrane fractions isolated from heat-shocked and heat-adapted aleurone cells contain a proportionately greater degree of saturated fatty acids than their nonheat-shocked counterparts. These observations suggest that the saturation of membrane fatty acids could contribute to thermotolerance during HS. To explore this relationship we have catalytically hydrogenated ER membrane phospholipids *in vivo* using the palladium catalyst palladium di-[sodium alizarine monosulfate] or Pd[QS]₂. Gas chromatographic data show that the catalyst increased the ratio of saturated to unsaturated fatty acids in the microsomal membranes. SDS-PAGE analysis reveals that catalytically hydrogenated samples synthesize significantly more alpha-amylase during HS than untreated controls. This suggests increased thermoprotection of the ER and secretory protein mRNAs during HS as a result of catalytic hydrogenation. We are currently using transmission electron microscopy to investigate whether dissociation of the ER during HS is to some degree arrested in catalytically hydrogenated samples.

THERMOTOLERANCE OF BARLEY ALEURONE CELLS BY SLOW RATES OF HEATING

Tracy M. Rodgers (Mark R. Brodl), Department of Biology, Knox College, Galesburg, IL 61401

When barley aleurone cells are heat shocked (temperature elevated from 25 °C to 40 °C) the synthesis of heat shock proteins (hsps) is reduced while the synthesis of normal secretory proteins is selectively suppressed. The synthesis of normal nonsecretory proteins, however, continues. The mRNA encoding secretory proteins is selectively destabilized. In addition, the endoplasmic reticulum (ER) lamellae, which serves as the site of secretory protein synthesis, fractionate and dissociate during heat shock. This may serve as the basis for selectively targeting the suppression of secretory protein synthesis. Earlier work in our laboratory has shown that heat shock enhances the level of fatty acid saturation in membrane phospholipids. This suggests that the cells may be able to adapt to gradual increases in temperature (2.5 °C/0.5 h) to 40 °C (the normal heat shock temperature). We report here on studies which reveal that during slow rates of heating to 40 °C (heat *stress* versus heat *shock*), the synthesis of secretory proteins as revealed by SDS-PAGE was not suppressed and hsps synthesis was not detectable. We are currently examining secretory protein mRNA stability and ER membrane integrity during heat stress. We will also examine the saturation of fatty acids in ER membrane phospholipids to correlate any changes in the membrane integrity with membrane composition.

MEMBRANE PHOSPHOLIPID COMPOSITION AND ITS POTENTIAL LINK TO SECRETORY PROTEIN mRNA STABILITY DURING HEAT SHOCK. Mark R. Brodl, Biology Department, Knox College, Galesburg, IL 61401

When exposed to heat shock, barley aleurone cells rapidly suspend the synthesis and secretion of hydrolytic enzymes to which these cells are normally devoted. This suspension involves the selective destabilization of secretory protein mRNAs. In the absence of heat shock, the half lives of these mRNAs is much greater. Concomitant with mRNA destabilization there is a dissociation of the ER lamellar network upon which these mRNA are translated. We have hypothesized that the destabilization of secretory protein mRNA is due to the loss of translation sites precipitated by ER lamellae dissociation. As a result, ER membrane integrity may be an important factor in regulating mRNA stability and ultimately gene expression. The fatty acids associated with phosphatidyl-choline (the main phospholipid of this ER) shift from relatively longer-chain, unsaturated to shorter-chain, saturated species during heat shock. In addition, the incorporation of [¹⁴C]-glycerol into phospholipids is substantially shifted to phosphatidylcholine during heat shock (50% of total phospholipids in the absence of heat 70% during heat shock). Cells exposed to continuous high temperatures recover the ability to synthesize secretory proteins. The shift in phosphatidylcholine formation may be essential for maintaining membrane stability and enabling high temperature adaptation.

AN ULTRASTRUCTURAL AND HISTOCHEMICAL STUDY OF THE DIGESTIVE TRACT OF *THEMISTE LAGENIFORMIS* (Phylum Sipuncula). L.K. Dybas and S. Kishore. Knox College, Galesburg, IL, 61401. *Themiste lageniformis* are small, exclusively marine invertebrate animals with digestive tracts consisting of a mouth, a straight esophagus, a descending and ascending spirally wound, U-shaped gut, and straight rectum. The basic three-layered plan of the gut is a columnar epithelial layer, an underlying connective tissue layer with interspersed smooth muscle fibers, and a peritoneal layer facing the coelomic cavity. The epithelial layer is characterized by a unique association of microvilli and cilia on the apical surface of the same cell. Numerous large granulocytes line the coelomic cavity side. These are especially prominent in the esophageal region. Histochemical staining with alcian blue, acid and alcohol phosphatase, cellulase, and aminopeptidase was conducted to identify the granular content and to further understand the structural and functional correlation in each of the regions.

CORRELATION OF STRUCTURE AND FUNCTION IN URNS OF *PHASCOLOSOMA PERLUCENS*. (Phylum Sipuncula). L.K. Dybas and L. Samuel. Knox College, Galesburg, IL 61401. Urns are multicellular structures composed of ciliated and non-ciliated cells and are believed to be secreting mucous. A study of mucous hypersecretion in urns of *P. perlucens* was conducted with various abnormal fluids. The tails were stimulated with Gram-positive bacteria, Gram-negative bacteria, foreign serum and red blood cells. *Vibrio fischeri*, a Gram-negative bacterium stimulated the fastest and the longest tails. The tails were measured to be 4x the urn cell length within thirty minutes. Presence of coelomic fluid apparently has no effect on tail formation. Urns suspended in sea water (two-fold dilutions of coelomic fluid down to 0.09% coelomic fluid) still produced tails when challenged with *Vibrio*. Ultrastructure of secretory and non secretory cells was also conducted. Comparisons are made between the secretory process in *P. perlucens* urns to those of *Sipunculus nudus* urns.

ULTRASTRUCTURAL EFFECTS OF PRIMARY ALCOHOLS ON FAT BODY CELLS OF *DROSOPHILA MELANOGASTER*. Marc L. Martel, L.K. Dybas, and B.W. Geer. Knox College, Galesburg, IL 61401. *D. melanogaster* is a model system for investigations of the genetic factors that underlie ethanol tolerance. The species is not only tolerant to ethanol, but is able to use ethanol as a food source. Although the natural diet of *D. melanogaster* contains 3% or more ethanol, other primary and secondary alcohols are present. Primary alcohols are apparently utilized as energy sources through the activity of alcohol dehydrogenase (ADH), which is concentrated in the larval gut and fat body. Therefore, the capacity of the larvae to detoxify and utilize various alcohols may be correlated to the ultrastructure of the fat body. *D. melanogaster* develops varying tolerances to different alcohols. In previous studies ethanol and isopropanol were found to kill 50% of larvae in a tolerance test at concentrations of 3.5% (v/v) and 1.5%(v/v), respectively. In this study, the fat body ultrastructural changes of dietary n-propanol and n-butanol are analyzed at the LD50 of 1.5% (v/v), for both alcohols.

ANOMALOUS BEHAVIOR OF PORCINE BETA-GALACTOSIDASE ON CONCANAVALIN A-SEPHAROSE. W. Kaiser, S. DeLon, M. Pineiro, and W. Daniel, University of Illinois, Urbana, IL 61801. Mammalian beta-galactosidase occurs as part of a large multienzyme complex at acid pH characteristic of lysosomes. Under neutral to weak alkaline conditions, the enzyme exists as a monomer. Unlike most mammalian beta-galactosidases, the monomeric porcine enzyme fails to bind to Concanavalin A-Sepharose. Several other porcine acid hydrolases, including arylsulfatase A and beta-glucuronidase, bind to this affinity support. Treatment of beta-galactosidase with neuraminidase increased binding by about 33%; however, the majority of the enzyme continued to elute with the void volume. This result suggests that blocking of N-linked oligosaccharides by sialic acid is not responsible for the anomalous behavior of the enzyme.

ISOLATION AND PARTIAL PURIFICATION OF THE PUTATIVE *TETRAHYMENA* CALTRACTIN/CENTRIN HOMOLOGUE. J.J. Maciejewski, E.J. Vacchiano, and H.E. Buhse, Jr., University of Illinois at Chicago, Chicago, IL 60680. A *Tetrahymena pyriformis* protein was isolated and purified which possessed many of the properties of *Chlamydomonas caltractin*. These properties included its 20 kD molecular weight, cytoskeletal nature, high salt solubility, heat stability, and ability to bind phenyl-Sepharose in a calcium-dependent manner. Immunoblot analysis showed that this protein was recognized strongly by an antibody raised against *Chlamydomonas caltractin*, but recognized only weakly at best by antibodies recognizing other *Tetrahymena* calcium-modulated proteins. Efforts are underway to clone the gene encoding this putative *Tetrahymena* structural calcium-modulated protein.

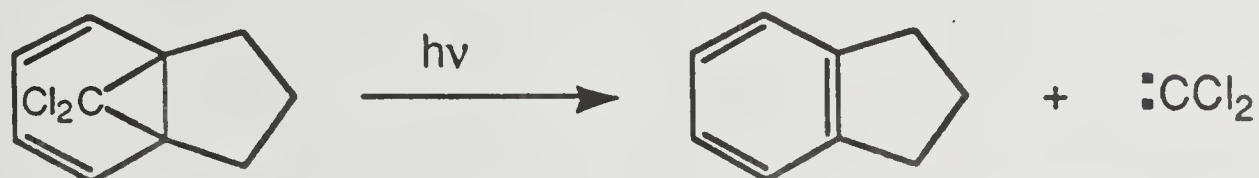
RESULTS OF IMMUNOLOGICAL STUDIES USING PUTATIVE *VORTICELLA* SPASMIN PROTEINS. E.J. Vacchiano, and H.E. Buhse, Jr., University of Illinois at Chicago, Chicago, IL 60680. Mass-cultured, attached *Vorticella* were used to obtain large numbers of purified contractile stalks. These stalks were used in immunoblot analysis to show that a 20kd stalk protein, a putative spasmin protein, is immunologically related to the well-characterized contractile calcium-binding protein, caltractin/centrin, found in the unicellular green algae *Chlamydomonas*. In addition, the purified stalks were used to generate a series of monoclonal antibodies against 20kd stalk proteins. One of these antibodies, 1F5, recognized a spasmin protein. Several other monoclonal antibodies generated against *Vorticella* stalk proteins recognized 20kd proteins that did not possess some of the characteristics of typical calcium-modulated proteins. The relationship between the various 20kd stalk proteins, as well as the relationship of these proteins to other well-characterized structural calcium-binding proteins, is being determined.

SOLVENT EFFECTS IN THE REACTION OF CARBOETHOXYCARBENE WITH AN ALKENE. Alexandra Katauskas and JoAnn DeLuca, Illinois State University, Normal, IL 61761.

Possible complexation of a carbene by a solvent molecule has been examined in the reaction of carboethoxycarbene, generated by the photolysis of ethyl diazoacetate, with 2,3-dimethyl-2-butene. The three products of the photolysis were isolated by preparative gc and characterized by NMR spectroscopy, mass spectroscopy and analytical gc. The three products resulted from carbene addition to the double bond, insertion into the C-H bond, and Wolff rearrangement. The reaction has been performed in neat 2,3-dimethyl-2-butene, ethyl ether, cyclohexene, benzene, and pentane. Solvent effects have been observed. Possible explanations for the solvent effect include formation of complexes with the solvent and variance in solvent polarity.

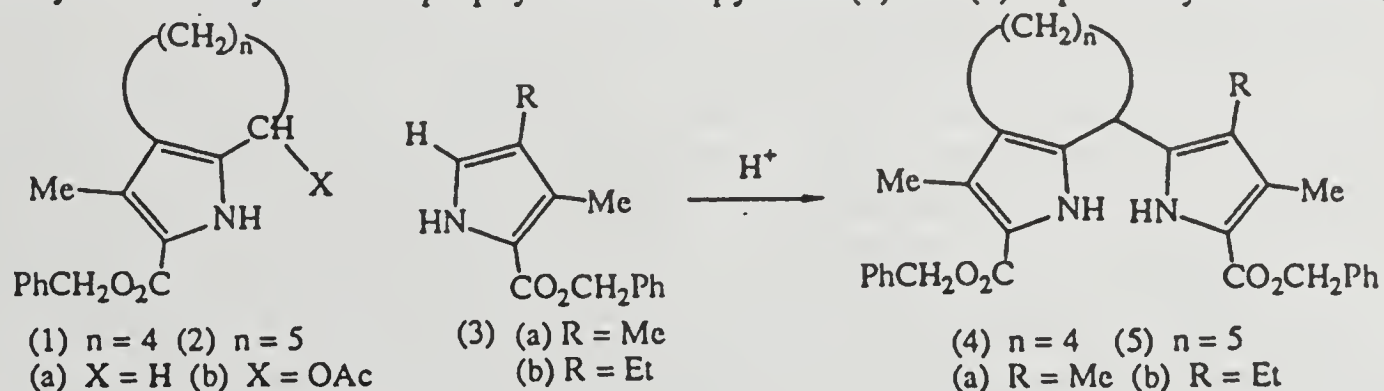
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THE INFLUENCE OF SUBSTRATE METHOXY AND HYDROXY GROUPS ON THE ADDITION OF DICHLOROCARBENE TO A DOUBLE BOND. Douglas W. Walker and JoAnn P. DeLuca, Illinois State University, Normal, IL, 61761. The influence of a substrate hydroxy or methoxy group on the stereochemistry of addition of a "dichlorocarbene" to a double bond has been investigated by several researchers, and contradictory results have been reported. This question is being reinvestigated using a free carbene generated by photolysis of 10,10-dichloro[4.3.1]propella-2,4-diene.

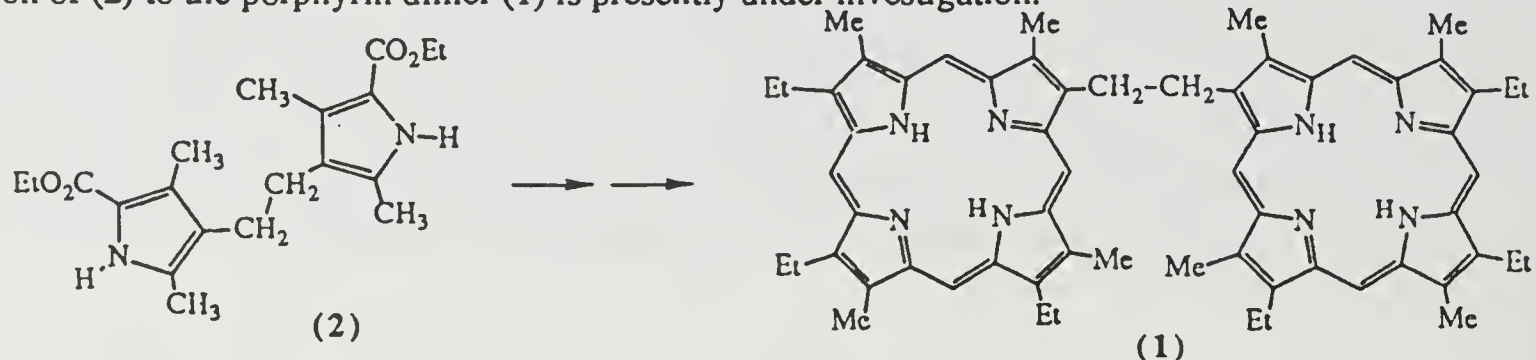


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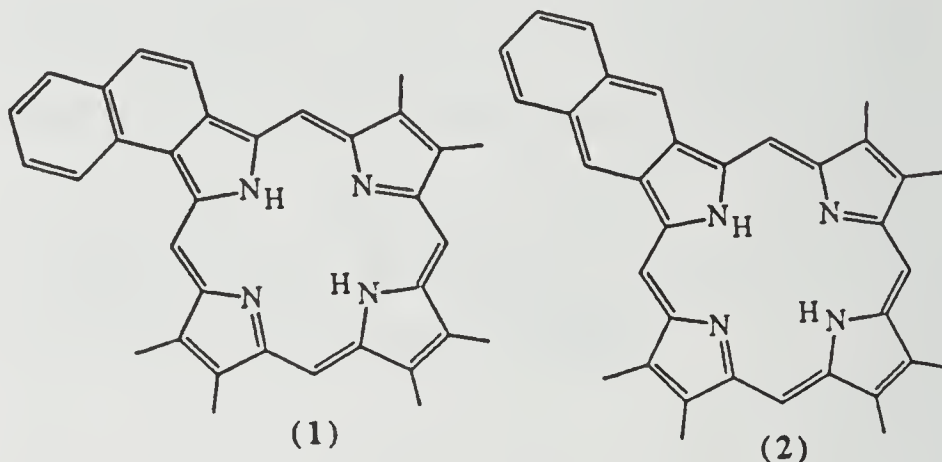
SYNTHESIS OF PORPHYRINS WITH SEVEN- AND EIGHT- MEMBERED EXOCYCLIC RINGS. Jolie A. Bastian and Timothy D. Lash, Department of Chemistry, Illinois State University, Normal, IL 61761-6901. Metalloporphyrins with exocyclic rings are commonly present at low concentrations in oil shales and petroleum. As an aid to structure elucidation studies, we have developed new strategies for the synthesis of these sedimentary compounds. In the present studies, we are developing new syntheses of porphyrins with seven- and eight-membered exocyclic rings. Cycloalka[b]pyrroles (1a) and (2a) were prepared in one step from cycloheptanone and cyclooctanone, respectively. Reaction with lead tetraacetate afforded the corresponding acetoxy derivatives, (1b) and (2b), and further reaction with α -unsubstituted pyrroles (3) in the presence of p-toluenesulfonic acid gave the dipyrroles (4) and (5). The synthesis of cycloalkanoporphyrins from dipyrroles (4) and (5) is presently under investigation.



STANDARDS FOR THE ANALYSIS OF HIGH MOLECULAR WEIGHT PETROPORPHYRINS: SYNTHESIS OF A PORPHYRIN DIMER WITH A TWO CARBON SPACER UNIT. Charles V. Rice and Timothy D. Lash, Department of Chemistry, Illinois State University, Normal IL 61761-6901. High molecular weight porphyrins have been identified in petroleum but the origins of these materials are obscure. Some studies have indicated that porphyrin dimers may be present in these fractions but further advances in this area have been hampered due to the absence of suitable synthetic standards. In order to address this problem, we are investigating the synthesis of a dimer structure (1) that is related to the well characterized petroporphyrin etioporphyrin-III. The key intermediate in this study, 1,2-dipyrrolylethane (2), has been prepared in five steps from 2,4-pentanedione. The conversion of (2) to the porphyrin dimer (1) is presently under investigation.



SYNTHESIS OF NAPHTHOPORPHYRINS. Tracy J. Roper, Carl P. Denny and Timothy D. Lash, Department of Chemistry, Illinois State University, Normal IL 61761-6901. Although benzoporphyrins have been the subject of many investigations, naphthoporphyrin systems such as (1) and (2) were previously unknown. It has been speculated that naphthoporphyrins and related extended aromatic structures may be present in mature organic sediments such as petroleum, and synthetic standards are needed to corroborate this proposal. In addition, porphyrin-like systems with extended chromophores are being actively investigated as potential sensitizers for photodynamic tumor therapy and naphthoporphyrins may be of value in this regard. The first synthesis of a naphtho[1,2-b]porphyrin (1), starting from 2-acetyl-1-tetralone, has been completed. Details of this work, together with preliminary results on the synthesis of dinaphthoporphyrins and naphtho[2,3-b]porphyrins (2) will be reported.



AN ESSENTIAL REACTIVE CYSTEINE IN THE MITOCHONDRIAL FORM OF PHOSPHOENOPYRUVATE CARBOXYKINASE FROM THE CHICKEN. J. J. Pflug and S. L. Weldon, Illinois State University, Normal, IL 61761. Phosphoenolpyruvate carboxykinase (PEPCK) controls the first step in the gluconeogenic pathway by catalyzing the conversion of oxalacetate to phosphoenolpyruvate using guanosine 5'-triphosphate (GTP). A cysteine near the active site of rat cytosolic PEPCK (PEPCK-C) reacts rapidly in the presence GTP affinity analogs or with cysteine modifying reagents, resulting in loss of enzymatic activity. This cysteine has been located within the peptide chain of PEPCK-C using N-(7-dimethylamino-4-coumarinyl) maleimide (DACM) by Lewis et.al. (*J. Biol Chem.* **264**, 27-33, 1989). The goal of this project is to identify this reactive cysteine in the mitochondrial form of PEPCK from chicken (PEPCK-M). A 10-fold molar excess of DACM over PEPCK-M was needed to completely inactivate the enzyme. With the essential cysteine modified, all the remaining cysteines in the protein will be reacted with iodoacetic acid in the presence of 6 M guanidine HCL. Once this denaturant is removed, the enzyme will be digested with trypsin and the resulting peptides separated by HPLC using a 0.1% trifluoroacetic acid - acetonitrile gradient on a C18 silica matrix. By locating the absorbing peak at 383 nm, the DACM-modified peptide can be pooled and sequenced by Edman degradation.

THE VICINAL CYSTEINE IN PHOSPHOENOLPYRUVATE CARBOXYKINASE OF CHICKEN MITOCHONDRIA. K.A. Bode and S.L. Weldon, Illinois State University, Normal, IL 61761. Phosphoenolpyruvate carboxykinase (PEPCK) uses a guanosine triphosphate to catalyze the production of phosphoenolpyruvate to form glucose from non-carbohydrate sources. This enzyme is susceptible to inactivation by sulfhydryl reagents, which can crosslink two cysteines near each other in the active site resulting in a disulfide bridge formation. One of these cysteines is necessary for activity and has been labelled as essential, the other is the vicinal cysteine. The main objective of this project is to modify, isolate and identify the vicinal cysteine in order to determine its effect on the enzymatic activity of PEPCK. The procedure will involve forming the disulfide bridge in the presence of 5,5'-dithiobis(2-nitrobenzoate) and then capping the remaining cysteines with iodoacetic acid, followed by a reduction of the bridge and labelling the two free cysteines with ^{14}C -iodoacetic acid. After digestion of PEPCK with trypsin, the fragments will be separated by HPLC, and the sequence of the radiolabelled fragments determined by Edman degradation in order to locate the vicinal cysteine. To date, we have determined the appropriate conditions for tryptic digestion and peptide separation by HPLC. Information on the vicinal cysteine should aid in a better understanding of the GTP binding site and active site of PEPCK.

BACTERIAL EXPRESSION OF THE CYTOSOLIC FORM OF CHICKEN PHOSPHOENOLPYRUVATE CARBOXYKINASE. R. A. Worthington and S. L. Weldon, Illinois State University, Normal, IL 61761. Phosphoenolpyruvate carboxykinase (PEPCK) is a key regulatory enzyme in the gluconeogenesis pathway which synthesizes glucose from non-carbohydrate sources. The goal of this project is to place the DNA encoding the PEPCK protein behind an inducible promoter in a bacterial expression vector, allowing the production of the avian protein in *Escherichia coli*. The start and stop codon of the DNA encoding cytosolic PEPCK (PEPCK-C) have been established by DNA sequencing of the bacterial plasmids pCK 5cc and pCK 10cc. Synthetic DNA primers will be prepared so that the protein coding region can be amplified by the polymerase chain reaction. With both the start and stop signals in place, this PEPCK-C DNA will be cloned into the expression vector, pTRC 99A, which will then be transformed into JM105 bacteria. The amount of enzyme produced by the bacteria will be controlled by the addition of isopropyl- β -D-thiogalactoside, which stimulates the *trc* promoter of pTrc 99A. The recombinant PEPCK-C will then be compared to the naturally occurring form of the enzyme. If identical, this system will be used as a more readily available source of this labile enzyme from chicken kidney.

BACTERIAL EXPRESSION OF THE MITOCHONDRIAL FORM OF PHOSPHOENOLPYRUVATE CARBOXYKINASE FROM THE CHICKEN. M. F. Simone and S. L. Weldon, Illinois State University, Normal, IL 61761. Phosphoenolpyruvate carboxykinase (PEPCK) catalyses one of the key steps in the synthesis of glucose from non-carbohydrates. The stable mitochondrial form of this protein (PEPCK-M) has been used for a variety of group-specific modifications which have characterized key amino acids in the active site of the enzyme. The objective of this research is to place the cDNA of the chicken PEPCK-M in a prokaryotic expression vector, thus allowing expression of the recombinant protein. During cDNA cloning, the protein coding portion of the PEPCK-M gene was found in three overlapping clones present in separate plasmids. The essential portions of these clones have been removed by restriction endonucleases in order to place the entire sequence in one plasmid. The intact PEPCK-M cDNA will be cloned into the expression vector pTrc 99A for transformation into *Escherichia coli*. Once in the bacteria, the expression of PEPCK-M can be regulated by isopropyl- β -D-thiogalactoside, which stimulates the *trc* promoter of expression vector. Recombinant and native PEPCK-M will be analyzed for their enzymatic and structural properties. The pTrc 99A expression system will provide a mechanism for investigation of the active site amino acids by site-directed mutagenesis.

MONOCLONAL ANTIBODIES AS STRUCTURAL PROBES OF THE ISOZYMES OF PHOSPHOENOLPYRUVATE CARBOXYKINASE. M.L. Hamilton, A.A. Vance, and S.L. Weldon, Illinois State University, Normal, IL. 61761. Phosphoenolpyruvate carboxykinase (PEPCK) is an enzyme which regulates the gluconeogenic pathway, which synthesizes glucose from non-carbohydrate sources. Two isozyme forms are found in chicken: a mitochondrial form (PEPCK-M) and a cytosolic form (PEPCK-C). These isozymes demonstrate similar catalytic properties and share 60% amino acid identity. In order to distinguish between the isozymes, a library of monoclonal antibodies has been generated against PEPCK-M. These antibodies have been prepared by injecting enzymatically active PEPCK-M into mice to form antibody-producing spleen cells. These cells have been fused with myeloma cells to make approximately one hundred hybridomas which were selected by regulating the hypoxanthine-guanine phosphoribosyl transferase gene and monitored by enzyme linked immunosorbent assays (ELISA). Secondary screening of these hybridomas will include testing the monoclonal antibodies for their ability to directly bind in ELISA to PEPCK-C as well as Western blotting of PEPCK-M and PEPCK-C. Characterization of isozyme-specific monoclonal antibodies will aid in the analysis of regions of protein structure specific to PEPCK-M and proteins produced by recombinant DNA techniques.

THE EFFECTS OF EXERCISE DETRAINING ON VON WILLERBRAND FACTOR IN BLOOD PLASMA OF MALE RATS
J.S. Christopherson, Michelle Ross, and M.A. Jones, Department of Chemistry,
Illinois State University, Normal, IL 61761-6901.

A complete understanding of what variables control blood clotting is unknown (Broze, Jr. and Gailani, 1991). In this study, the relationship between physical exercise (swimming) and the blood coagulation factor, von Willerbrand factor will be examined. Without von Willerbrand factor circulating in the blood, platelet aggregation is severely diminished and symptoms resembling hemophilia result. This study uses F344 male rats separated into three experimental groups; regularly exercised, strenuously exercised and a control group of rats (which do not swim). Rats will be exercised for 16 weeks and then detrained for 8 weeks. The levels of plasma von Willerbrand factor (and other blood coagulation factors) are being measured over the course of this experiment using an indirect enzyme linked immunosorbent assay (E.L.I.S.A.). Changes in von Willerbrand concentration related to these various exercise patterns will be reported.

EVALUATION OF SKIN LIPID CONTENT FROM EXERCISING AND CONTROL RATS
Kathy Wescom and M.A. Jones, Departments of Chemistry and
Biological Sciences, Illinois State University, Normal, Il. 61761

Exercise has been reported to affect the development of coronary heart disease. We have studied a swimming rat model for changes in cholesterol and triglyceride serum levels. We are now interested in the types and amounts of lipids which are found associated with the skin and how these are modified with exercise training and detraining. Following an exercise training and detraining protocol, we obtained skin flaps which were extracted using a Soxhlet apparatus and petroleum ether. Following concentration of the extracts, samples were evaluated by TLC. The majority of lipids extracted were triglycerides. The technique is now being applied to animals from each of the exercise protocols for relative comparisons. The data should allow for evaluation of effectiveness of exercise in decreasing skin lipids.

IMMUNOPRECIPITATION OF ALBUMIN TO ENHANCE EVALUATION OF PROTEINS FROM HUMAN PERITONEAL DIALYSIS FLUIDS. P.E. Denney, J.T. Hjelle*, M.A. Jones, Illinois State University, Normal, Il. 61761 and *Dept. of Basic Sciences, University of Illinois Medical School, Peoria, Il. 61656.

Peritoneal dialysis is one method of treating Polycystic Kidney Disease. However, this type of dialysis can have subsequent detrimental effects on the patient. Unfortunately, the biochemical mechanisms of these effects are as yet poorly understood. The mesothelial cells which line the peritoneal cavity are likely damaged during long term peritoneal dialysis and could then allow leakage of materials in and out of this cavity. We have collected peritoneal dialysis fluids from Continuous Ambulatory Peritoneal Dialysis (CAPD) patients to evaluate the proteins which are found in the fluids after 4-8 hours in vivo. The fluids used are devoid of protein and contain mineral salts and glucose. Following dialysis the fluid contains substantial amounts of protein (.59mg/ml). Using SDS gel electrophoresis we have previously found that 4-9 proteins are found. However, one protein was found in such substantial concentrations that it might mask other proteins. Therefore, antiserum which recognizes human albumin has been used to immunoprecipitate this protein. Using 4°C overnight we are able to precipitate this protein suggesting strongly that it is human albumin and that it represents protein which has leaked from the circulation into the peritoneal cavity of the patients. We are now evaluating a number of patients for this phenomenon. (supported by AIURP)

EVALUATION OF RABBIT LIVER MITOCHONDRIA FOR COPROPORPHYRINOGEN OXIDASE ACTIVITY C. Zhen, T.D. Lash, and M.A. Jones, Department of Chemistry, Illinois State University, Normal, IL 61761. Heme biosynthesis is a very important metabolic pathway and defects in this pathway can result in a number of medical problems such as the porphyrias. In the later stages of heme biosynthesis, the mitochondrial enzyme coproporphyrinogen oxidase converts coproporphyrinogen-III to protoporphyrinogen-IX. However the oxidase has not been as well characterized as many of the other enzymes in this pathway. While extracts from chicken red blood cell (RBC) lysates and rat liver have been used to partially isolate and characterize the oxidase, this enzyme has not yet been studied in rabbit liver. We have therefore used rabbit liver mitochondria to evaluate the apparent substrate specificity for this reaction. Reaction conditions including incubation time, buffer, and pH have been evaluated. The formation of porphyrin products was investigated by thin layer chromatography. We are presently evaluating the substrate specificity of the rabbit enzyme and the results will be compared to those previously reported for chicken RBC lysates. Synthetic porphyrin samples are also being evaluated using the rabbit liver coproporphyrinogen oxidase system. (Work supported by NIH 1 R15 DK45206-1)

USE OF SDS-POLYACRYLAMIDE GEL ELECTROPHORESIS TO EVALUATE AFFINITY COLUMN PURIFICATION OF COPROPORPHYRINOGEN OXIDASE. T. Hall, T.D. Lash, and M. A. Jones. Dept. Chemistry, Illinois State University, Normal, Il. 61761. A key step in heme biosynthesis involves the conversion of coproporphyrinogen III to protoporphyrinogen IX by the enzyme coproporphyrinogen oxidase. This mitochondrial enzyme has not yet been well characterized biochemically. We have therefore developed an affinity column, using covalently coupled coproporphyrin III, to simplify the isolation procedure. Rabbit liver mitochondrial extracts were loaded on the column then eluted using 10mM potassium phosphate buffer, pH 6.8, with increasing concentrations of KCl (from 0.15M to 1.0M). Fractions from the column were assayed for total protein (Lowry et al., 1951), as well as by SDS-polyacrylamide gel electrophoresis. The results show that some 4 to 6 proteins were retained by the column after washing with 0.2M KCl but were eluted using 0.5M KCl. The data suggest that some mitochondrial proteins have a specific affinity for this column. (Work supported by NIH 1 R15 DK45206-1).

PARTIAL PURIFICATION OF RABBIT LIVER COPROPORPHYRINOGEN OXIDASE BY AFFINITY CHROMATOGRAPHY. Z.P.Jiang, M.A.Jones, and T.D.Lash, Illinois State University, Normal, IL. 61761. Coproporphyrinogen oxidase, a mitochondrial enzyme, catalyzes the conversion of coproporphyrinogen III to protoporphyrinogen IX, which is a key step in the heme biosynthetic pathway. Although former studies have shown that this conversion is highly specific, the enzyme is known to metabolize a number of synthetic substrates. To determine the specificity of coproporphyrinogen oxidase by comparing the K_m and V_{max} for each suitable synthetic substrate, and to further develop a model for the active site of the enzyme, a relatively pure enzyme is needed. We therefore are developing a procedure for purifying this enzyme from rabbit liver mitochondrial extracts. This procedure uses an affinity column that has been coupled with coproporphyrin III, a derivative of the natural substrate. The application of this affinity chromatography can be used to simplify the isolation procedure. (Work supported by NIH 1 R15 DK45206-1)

SYNTHESIS AND PURIFICATION OF OXAZOLIDINE NITROXIDES. Brian Pelz and Philip D. Morse II. Department of Chemistry, Illinois State University, Normal IL 61761. Nitroxides are stable free radicals which are reduced and reoxidized by cells and organisms. Nitroxides have been shown to act as superoxide dismutase mimics and also have the potential to act as contrast agents for magnetic resonance imaging (MRI). It is therefore necessary to understand the metabolism of nitroxides in cells. Oxazolidine nitroxides are one class of nitroxides which can be used to study oxidation-reduction reactions in biological membranes. Most oxazolidine nitroxides are not commercially available. We have begun work on a class of nitroxides derived from hydrocarbons. These use ketones as starting materials and involve the condensation of 2-amino-2-methyl-1-propanol to the ketone. The resulting oxazolidines are purified and oxidized to the corresponding nitroxides which are further purified for use in the analysis of cell metabolism.

Supported by NIH grant R15 GM44365-1 to PDM.

TEMPOL ADVERSLY AFFECTS T LYMPHOCYTE PROLIFERATION IN BALB C SPLEEN CELL CULTURES BY REDUCING CELL VIABILITY. John R. Bobell and Philip D. Morse II. Department of Chemistry, Illinois State University, Normal IL 61761. The metabolism of nitroxides has important implications for their use as probes of biochemical function and as contrast agents for magnetic resonance imaging in a medical setting. We are concerned with the potential toxicity of nitroxides and the ability of nitroxides to affect cell function. We have focused initially on cells in the immune system.

Our work demonstrates that 8 hour exposure of BALB C splenic cell cultures to 5mM and 1mM concentrations of the nitroxide TEMPOL affect T lymphocyte proliferation of cells stimulated by CON A and that reduced cell viability is the major cause of this effect.

Supported by NIH grant R15 GM44365-1 to PDM.

REDUCTION OF THE NITROXIDE TEMPOL BY MOUSE BLOOD. Andrea M. Weise, John Bobell, and Philip D. Morse II. Department of Chemistry, Illinois State University, Normal IL 61761. Current medical methods imply that contrast agents for magnetic resonance imaging will be introduced into the body by way of the blood stream. We have studied the rate of reduction of the nitroxide TEMPOL in whole and fractionated mouse blood to understand the probable sources of nitroxide reduction in blood.

We have found that red blood cells and plasma reduce TEMPOL at about equivalent rates whereas reduction by the white blood cells is insignificant. Ascorbate oxidase diminishes TEMPOL reduction by plasma by about 90% and lysed red blood cells by about 30%. Thus, ascorbic acid and red blood cells play equally important roles in reduction of TEMPOL by blood.

Supported by NIH grant R15 GM44365-1 to PDM.

PLANET: A NETWORK PLANNING PROGRAM. Charles E. Neblock. Western Illinois University. Macomb, IL 61455. It is desirable for Computer Networking students to be provided an opportunity to accomplish a network design, however, the amount of computation required to verify network designs has prohibited the assignment of separate projects to each student, as a result many students have relied on other class members to complete the project and have participated only minimally. PLANET has increased teaching effectiveness by automating the design process thus permitting individual assignments for each student and making it possible for the teacher to monitor the progress of each individual.

THE CASHLESS SOCIETY. C. Pilks and L. Leff. Western Illinois University, Macomb, IL 61455. A cashless society is one in which all transactions now done with cash, check or wire would be done using a global Electronic Fund Transfer System. We total the costs of such a computer system, including identification cards, telecommunications and computer equipment and compare the costs for our current mechanisms (cash, check and Fedwire). We look at other advantages of such a system as well as privacy considerations. Advantages of our proposed system include building a base for other applications and businesses such as law enforcement, immigration control, vending machines and self-checkout in stores.

SYMBOLIC MATH CONSTRUCTIVE SOLID GEOMETRY (CSG) SYSTEM. T. Trias and D. Thompson and L. Leff and Z. Malik. Western Illinois University, Macomb, IL 61455. The program takes as input, a symbolically-defined CSG expression. Output is the boundary of the resulting object with endpoint locations as mathematical expressions as well as inequalities on the variables in expressions. Inequalities ensure object remains conceptually the same as parameters vary. An input database allows the definition of new primitives and curve-types in terms of arbitrary expressions. The system has been implemented in MAPLE, a symbolic math system. It has been tested on several examples including five data items to plot the time behavior as a function of the number of primitives.

TWO PROGRAMS FOR SCHEDULING POLICE OFFICERS. B. Jones and W. Pittenger and Laurence L. Leff and R. Reinertsen and Michael H. Hazlett. Western Illinois University, Macomb, IL 61455. These systems treat each month as 31 days, each with three possible shifts. Officers are assigned to work on particular shifts on particular days. Each officer has two specific days off each week and a regular shift (day, evening or graveyard.) Union rules and departmental policy will constrain possible changes to these defaults each week. Both programs assign the police officers to the possible shifts, taking into account the manpower needs for each shift of each day. One is written in LISP and the other in PASCAL. Both are rule-based to allow new requirements to be added easily. They use A* with a heuristic we show admissible but non-monotonic.

SOME COMPUTER RESULTS ON THE ARITHMETICS OF CAYLEY'S ALGEBRA. Patrick Lamont, Western Illinois University, Macomb, IL 61455. Let J denote any arithmetic [1] of Cayley's algebra C . Proofs and examples will be given of the following results. (a). A necessary and sufficient condition for an octant of J to be a quadratic residue in J modulo an odd integer will be given. (b). If odd integer n divides the norm of octant X of J where n and twice the real part of X are relatively prime, then X to the power one plus the number of rational primes up to n relatively prime to n is congruent to X modulo n in J . (c). Public key cryptosystems are definable using the arithmetics J .

[1] P. J. C. Lamont, Unique factorization in Cayley arithmetics and cryptology. Glasgow Math. J. 33 (1991), 267-273.

THE HYPERTEXT-BASED EXECUTIVE INFORMATION SYSTEM. V. Ratnaprasad and C. Amaravadi and L. Leff. Western Illinois University, Macomb, IL 61455.

Due to a rapidly changing business environment, executives need to process information relating to the effects of changes. Most executive information systems provide information rather than a means to process it. Part of the reason for this state of affairs is the large number of variables and their interrelationships. Cause mapping is one method of processing environmental information that can provide qualitative results. There is a natural identity between cause maps and hypertext. The nodes of the cause map correspond to windows of the hypertext. A hypertext based system has been implemented based on the cause mapping methodology. The system was implemented in a PC environment using C++ language and a GUI toolkit.

SYMBOLIC FINITE ELEMENT ANALYSIS SYSTEM. M. Kyaw and L. Leff. Western Illinois University, Macomb, IL 61455. The system generates a custom FORTRAN code to compute a global stiffness matrix for finite element analysis. It takes as input a symbolic description of a regular grid. The input file allows the description of arbitrary grids involving varying shapes, and elements. The system has been run on several problems involving both even and uneven discretizations. It gave the same answers for displacements as commercial code, FLEX, only faster. This FORTRAN code is designed to be used in shape optimization systems.

A BRIDAL SHOP EXPERT SYSTEM. S. Buasai and L. Leff, Western Illinois University, Macomb, IL 61455. It assists the salesperson in selecting the dresses for bride and bridesmaid from a database of different dresses and style characteristics. The system also uses manufacturer's size charts. It calculates costs of required modifications for each candidate's dress to make it fit. This is done using various rules corresponding to various alterations possible. This allows a tradeoff between dress cost and cost to alter it. The system is implemented in Knowledgepro on the IBM PC. This is a hypertext-oriented expert system tool.

THE EVOLVING GAS STATION, A GPSSH EXAMPLE FOR A SIMULATION COURSE. L.H.Tichenor, Western Illinois University, Macomb, Il 61455. A Simulation course was presented to the upper division C.S. Honors students during the Spring, 1992. The course included the introduction of a simulation language, GPSSH, and a survey of a number of general simulation topics and strategies. The modelling of a single, well understood system by adding model components as the semester progressed reduced lecture complexity and allowed class discussions to focus on simulation topics. A generalized auto service station was chosen as the system to be modelled. The station and simulation evolved to include transactions, various generation distributions, resources and their utilization, queues, specific transaction requirements and attributes, branching, and finally comparative statistics.

COMPARISON OF THE PENNSYLVANIAN EURAMERICAN FOSSIL PLANT LESLEYA WITH THE PERMIAN GLOSSOPTERIS OF SOUTH AMERICA. Richard L. Leary, Illinois State Museum, Springfield, IL 62706. The Pennsylvanian foliage genus Lesleya of Euramerica has many morphological similarities with Glossopteris from the Permian of Gondwana. Lesleya and Glossopteris are characterized by linear-lanceolate, spatulate, and obovate leaves with broad midveins. Lesleya has secondary veins which depart the midvein at low angle and arch toward the margin, bifurcating one, two, or three times. Glossopteris is characterized by anastomosing venation. However, the oldest Glossopteris species in South America have few or no anastomosing veins. A recently discovered ovule-bearing Lesleya from Rock Island County, Illinois, has the same basic structure as some Glossopteris fructifications. This, and other evidence, suggests that Lesleya is an ancestor of Permian glossopterids.

A MEGAFUNA FROM THE BOSKYDELL SANDSTONE (MORROWAN) IN SOUTHWESTERN ILLINOIS. G.H. Fraunfelter, Southern Illinois University, Carbondale, IL 62901. A megafauna from the type Boskydell was studied in detail in order to determine the character of the megafauna, evaluate its stratigraphic utility, and identify the environments of deposition involved. The Boskydell megafauna is diverse. It includes fusulinids, corals, brachiopods, fenestrate bryozoans, gastropods, bivalves, nautiloids, crinoids, echinoids, trilobites, worm traces, conulariids, and shark dermal denticles. Brachiopods and gastropods exhibit the most diversity, while the trilobites are most abundant. Sandia welleri, a Morrowan index, fossil is present. Disarticulated specimens dominate this megafauna. However, many whole, well-preserved specimens are present. No immature specimens were found. This megafauna contains marine onshore, shelf, and offshore elements, with onshore and shelf dominant. Some transport, probably shoreward, is indicated. Hence, this fauna is diverse, stratigraphically significant, and shallow marine.

OBSERVATIONS ON AIRBORNE PARTICULATES IN RURAL ILLINOIS: 1985-1990. V. Gutowski and D. Osterman, Eastern Illinois University, Charleston, IL, 61920. An important element of the environmental quality of a given area includes the air quality. Most air quality monitoring stations are located near densely populated areas. Data collected at Charleston, a rural east-central Illinois town, indicates average monthly total suspended particulates exceed the secondary ambient air quality standard (60 ug/m³) on a seasonal basis. For the six-year sampling period the average TSP for the month of May was 63 ug/m³; June was the second highest month, averaging 56 ug/m³. These high readings during a relatively moist part of the year are related to agricultural activity during the planting season and are double the values measured during the winter season. Along with agricultural activity, soil moisture conditions appear to be the dominant control over TSP values in rural Illinois.

THE MARENGO METEORITE: THE SEVENTH DISCOVERED IN ILLINOIS. P.P. Sipiera, Schmitt Meteorite Research Group, Harper College, Palatine, IL 60067 and E.J. Olsen, Univ. of Chicago, Chicago, IL 60637. The Marengo stone meteorite is just the seventh meteorite found in the State of Illinois. This 68 gram specimen has a black fusion crust present on all sides but one. The remaining surface is highly weathered, but is very suggestive of a fracture plane where this portion separated from a larger mass while still in flight. Mineralogically, Marengo has olivine and pyroxene compositions of Fa25 and Fs21.2 respectively. This would place it in the category of an L type ordinary chondrite. An interesting aspect is found in the uniformity of these silicate compositions. This strongly suggests a high equilibration state. Petrographically, the interior structure reveals a general lack of whole chondrules, with lithic fragments dominating. A classification of L6 is most appropriate for this meteorite.

WHERE DOES FOOD COME FROM. C.J. Midden, and K.L.S. Midden, Southern Illinois University at Carbondale, Carbondale, IL 62901. Increasing environmental awareness in children is a necessary step in creating an environmentally aware society. Not only do we need to focus on the popular issues of deforestation, the hole in the ozone layer, etc. we also need to focus on helping children understand their everyday world. Increasing their understanding of where their food comes from is a necessary compliment to their development of a complete understanding of the world they live in. Active learning that is fun and fully engages the child's natural curiosity has been proven to be the most effective way to teach a subject. A computer game possesses these characteristics. Children are drawn to computers; engaged by the action the children will experience the lesson embedded in the game. 'Where Does Food Come From' is a computer game designed to introduce young people to the entire process food goes through from field to table.

A VERSATILE FLOW MODEL FOR RIVERINE AQUATIC HABITAT ASSESSMENT.

K.P. Singh and S.A. McConkey, Illinois State Water Survey, Champaign, IL 61820. A versatile flow model has been developed to replace the hydraulic submodel of the Instream Flow Incremental Methodology (IFIM) of the U.S. Fish and Wildlife Service. The flow model uses stream hydraulic geometry equations, regionalized flow durations, adjustments to flow parameters (flow velocity, depth, and width) derived from stream geometry vis-a-vis their values from field measurements, and their statistical distribution in naturally-occurring riffle and pool sequences. The flow model has basinwide applicability, it is theoretically sound, and it contains no dubious or untenable assumptions. It has been applied to aquatic habitat assessments in the Sangamon and Vermilion River systems in central Illinois.

A LONG-TERM ELECTROFISHING SURVEY SHOWS EVIDENCE FOR IMPROVED CONDITIONS ON THE UPPER ILLINOIS WATERWAY. T.V. Lerczak, R.E. Sparks, and K.D. Blodgett. Illinois Natural History Survey, Havana, IL 62644. Catch rates of largemouth bass, sauger, and bluegill have increased on the upper Illinois Waterway (above river mile 210, where river mile 0.0 is at Grafton, IL) since the early 1960's. Catch rates of largemouth bass fell during the 1988-89 drought, then increased with higher water levels in 1990. However, catch rates for all fish combined on the upper waterway are lower than on the lower waterway. Over the long-term, mean relative weights (W_r) for bluegill and largemouth bass were consistently close to 1.0 (where measured weight equals length-specific predicted weight for a population), while mean W_r 's for carp were consistently less than 1.0. Fish that contact bottom sediments (e.g., carp) have a higher incidence of external abnormalities than other fish. The incidence of external abnormalities on all fishes has decreased since the early 1960's. Return of piscivorous fishes to the upper Illinois Waterway indicates an improvement in water quality; the poor condition (low W_r and incidence of abnormalities) of bottom-feeders indicates a persistent problem with sediment quality.

EFFECTS OF GAS PIPELINE RIGHT-OF-WAY VEGETATION ON A POORLY DRAINED DECIDUOUS FOREST EDGE IN MIDLAND COUNTY, MICHIGAN: A DESCRIPTION OF THE OVERSTORY COMPONENT. *J.R. Rastorfer and J.A. Clemente, Chicago State University, Chicago, IL 60628; G.D. Van Dyke, Trinity Christian College, Palos Heights, IL 60463; and S.D. Zellmer, Argonne National Laboratory, Argonne, IL 60439. Two sites in Midland County, Michigan, have been established to study the development of plant communities on a gas pipeline right-of-way (ROW) and any compositional changes within adjacent forest communities that might be caused by ROW construction activities and plant communities of the ROW. The forested portions of the two sites differed in taxonomic composition and structural features. Site 1 had 26 species of trees with 19, 20, or 25 taxa in each of three belt transects, whereas Site 2 had 17 of the same species with 14 or 16 taxa in each of three belt transects. On the basis of 1989 sampling data, *Quercus bicolor* and *Fraxinus pennsylvanica* had the largest importance values (IVs) for both sites. Three *Acer* species were prominent in both sites, but their distributions were different. The IVs for *A. rubrum x saccharinum* were nearly the same for both sites. However, the IV for *A. rubrum* was larger for Site 1 than for Site 2, while the converse applied to *A. saccharinum*. Early seral species, such as *Betula papyrifera*, *Populus grandidentata*, and *P. tremuloides*, had larger IVs in Site 1 than in Site 2, which was indicative of recent selective logging in Site 1. Our 1989 overstory data will be compared with future studies to ascertain whether the ROW effected any changes in the adjacent forest communities. With respect to the ROW, the major tree invaders were species of *Populus* and *Salix*, although ROW maintenance practices usually eliminate woody species.

*Work supported by Gas Research Institute, 8600 W. Bryn Mawr Avenue, Chicago, IL 60631.

CAN ORGANIC MATTER ENHANCE THE NATURAL RECOVERY OF ACID MINE DRAINAGE CONTAMINATED LAKES? R. Govindacharyula and R. Brugam, Southern Illinois University, Edwardsville, IL 62026.

Experiments were conducted in 25 L. microcosms containing lake sediment and acid mine drainage to determine the effects of organic matter additions on neutralization of acid mine water. Sediment organic matter concentrations in the form of cow manure varied from 0 to 20%. Over a 30 day period pH rose to 6.5, acidity disappeared and sulfate concentrations declined in the organic-dosed microcosms. These results suggest that the process of neutralization might be enhanced in acid mine lakes by the addition of organic matter.

MANAGED LEVEE FLOOD STORAGE FOR ENHANCING FLOOD PROTECTION, WETLANDS, AND RECREATION. Krishan P. Singh and H. Vernon Knapp, Illinois State Water Survey, Champaign, IL 61820. Levees for numerous agricultural districts along the Illinois River are at risk of overtopping from major floods. A cost-effective approach for reducing flood levels and damages is presented, i.e., converting a few at-risk levee districts to store floodwaters when flows exceed a specified high stage. This approach would significantly reduce flood stages along the Illinois River, in effect providing flood protection for a large number of other levee districts. It would also provide an opportunity to establish recreation and wetland areas behind the converted levees. The proposed operation may afford comparable flood protection at a lesser cost than that which may be incurred by raising levees. In addition it creates a new potential for wetlands and recreation.

ENHANCEMENT OF IMMUNE FUNCTION IN MICE BY SPECTINOMYCIN AND OTHER ANTIBACTERIAL ANTIBIOTICS. C.W.Wilson and D.J.Kitz, Southern Illinois University at Edwardsville, IL 62026-1651. A number of antibiotics are known to boost murine immune response in addition to their antimicrobial properties. In particular antibiotics which are known to be concentrated by host phagocytic cells such as clindamycin show remarkable abilities to enhance delayed type hypersensitivity (DTH) to contact sensitizers such as the chemical antigens dinitrofluorobenzene(DNFB) and oxazolone, and to enhance microbicidal activity both in vitro by macrophages and in vivo. Our current studies are with the aminocyclitol antibiotic spectinomycin (Upjohn) which is primarily used to treat infections caused by penicillin resistant strains of Neisseria gonorrhoeae. We have found that spectinomycin, which is concentrated by phagocytic cells, boosts macrophage killing of Candida species in vitro and that this correlates with an increased clearance of yeasts following intravenous challenge. Similar findings have been seen with trospectomycin, a recent derivative of the parent compound spectinomycin. Finally, the ability of spectinomycin to boost murine DTH to DNFB will be determined using an ear-thickness assay. Our findings suggest that while use of antibiotics may decrease host resistance by altering normal flora, there are also drug enhanced positive effects on the immune system which benefit the host.

EFFECTS OF ANTIFUNGAL AGENTS ON MURINE IMMUNE RESPONSE. D. J. Kitz. Southern Illinois University at Edwardsville, Edwardsville, IL 62026-1651.

Many fungal infections have proven to be very difficult to treat due to structural similarities between eukaryotic human and fungal cells. Few drugs are able to target specific structures or metabolic pathways in fungal cells without causing serious side effects in the human patient. One drug long available for antifungal therapy is amphotericin B (Fungizone, Squibb) which targets ergosterol in fungal membranes, although this drug binds at a lower affinity to cholesterol present in human cell membranes. Interestingly, amphotericin B can profoundly influence murine immune response, effecting T cell, B cell and phagocytic cell function. Another obvious target which has rarely been exploited in fungi is their cell wall; the echinocandin class of molecules target this site. In addition to potent antifungal effects exhibited by the echinocandins, they also have been found to boost phagocytic cell killing of yeast targets and to enhance delayed type hypersensitivity response in mice. These findings show that antifungal molecules such as these appear to provide effects on the immune system which could potentially be beneficial to the host.

EFFECT OF TYROSINE KINASE INHIBITORS ON SECOND MESSENGER GENERATION. G.Nasetto, S. Karimpour and P. Wanda. Southern Illinois University at Edwardsville, IL. 62026-1651. Mammalian cell proliferation and development are initiated when chemical signals are received from the external environment and mediated to the nucleus of the cell. This signal transduction was characterized by analysis of intracellular levels of inositol-1,4,5-triphosphate (IP_3) and its breakdown products in the human myeloid leukemia cell line, K562, after addition of epidermal growth factor (EGF) or tumor promoter, 12-O-tetradecanoylphorbol-13-acetate (TPA) to the growth medium. Tyrosine kinase directed phosphorylation initiates the generation of the second messenger IP_3 . Cells were metabolically labeled with 3H -myoinositol, acid extracted, and analyzed by anion exchange chromatography and liquid scintillation counting. We found that the level of IP_3 increased after growth stimulation with EGF and decreased after cells were induced to differentiate with addition of TPA. The signaling mechanism involved in cell proliferation is clearly altered by signals for cell differentiation in K562 cells.

ISOLATION OF TETRAHYDROBERBERINE: SAM N-METHYLTRANSFERASE FROM ELICITED SUSPENSION CULTURES OF *SANGUINARIA CANADENSIS* L. B. O'Keefe¹, P. W. Morris² and C. Wm. W. Beecher¹, ¹PCRPS, Dept. of Med. Chem. and Pharmacognosy, ²Dept. of Biochemistry, University of Illinois at Chicago, Chicago, IL 60612

Sanguinaria canadensis L. (blood root) produces a spectrum of biologically active benzophenanthridine alkaloids. As part of a continuing study of the biosynthetic control mechanisms governing the production of these alkaloids, we report the isolation to electrophoretic homogeneity of one of the enzymes in this secondary metabolic pathway. The isolation was achieved using standard chromatographic techniques supplemented by a Applied Biosystems Model 230 HPEC native gel electrophoresis system which allowed for the retention of essentially all of the enzymatic activity: The specific enzyme isolated, tetrahydroberberine : S-adenosyl-L-methionine N-methyltransferase, catalyzes the transfer of a methyl group from the coenzyme S-adenosyl-L-methionine to the tertiary nitrogen of the isoquinoline nucleus of tetrahydroberberine and thus resides at a committed branchpoint in the biosynthesis of the benzophenanthridine alkaloids.

THE INHIBITORY PROPERTY OF ZINGIBER OFFICINALE ON THE REPLICATION OF CYANOPHAGE LPP-1. Lisa Y. Lee and Amrik S. Dhaliwal Loyola University Chicago, IL 60626. Recent studies have shown that the extract from Zingiber officinale rhizome inhibited the replication of cyanophage LPP-1 in cyanobacteria. Efforts have been made to fractionate and identify the inhibitory component from the Zingiber extract. Z. officinale extract was prepared by grinding the rhizome with a mortar and pestle and then centrifuging it at 10,000 rpm for 10 minutes. The supernatant was then filtered with 0.45 μ m millipores and used throughout the experiments. The extract was passed through sephadex G-100 column and thirty 5 ml fractions were collected. The fractions were tested for their inhibitory effects by the agar layer technique. Fractions which appeared to have inhibitory effects were further separated through Sephadex G-75 column. SDS Page gel of the inhibitory fractions revealed three distinct bands, ranging from 45 to 60 kd. Data indicated that the extract from Zingiber officinale rhizome strongly inhibited the replication of cyanophage LPP-1. Furthermore, it appeared that a protein might be responsible for the apparent viral replication inhibition.

SCANNING ELECTRON MICROSCOPY OF CYANOBACTERIA TREATED WITH ZINGIBER OFFICINALE FRACTIONS SEPARATED THROUGH SEPHADEX COLUMN. Humayra Ali and Amrik S. Dhaliwal. Department of Biology, Loyola University of Chicago, Chicago, IL 60626. Zingiber officinale obtained from the local grocery store was macerated with pestle and mortar using saline buffer (pH 7.0). Extract was passed through the cheesecloth and was centrifuged at 10,000 rpm for 10 minutes. Supernatant was passed through sephadex G-100 column. The fractions in the amount of 5 ml. were collected and tested for its inhibitory effects on cyanophage replication by plating them with cyanobacteria on agar plates. Fractions 10, 11, and 12 inhibited virus multiplication on cyanobacteria. Fraction number 10 was used to treat the cyanobacteria to determine if it caused any morphological changes in bacteria. Bacteria grown in Bolds medium under 12 hrs. of photo period and 23°C temperature for three weeks were treated with ginger extract and incubated. At various time intervals, the treated bacteria were processed for SEM studies. Incubated samples were fixed with 2% gluteraldehyde for 5 min. and washed with sodium cacodilate buffer, then fixed with OSO_4 for 5 minutes. Samples after dehydrating with ETOH series were fixed with 50% and then 100% peldri for 30 minutes each. Samples were then coated with gold and pallidium (sputtering) before they were studied with SEM. Studies indicated some morphological differences between extract treated and nontreated bacteria. Further studies need to be conducted to prove that these differences were real and due to the extract treatment.

INFECTIVITY STUDIES OF TOBACCO MOSAIC VIRUS TREATED WITH FRACTIONS OF THE EXTRACT OF ALLIUM CEPA SEPARATED THROUGH COLUMN CHROMATOGRAPHY. Sung Shim, Amrik S. Dhaliwal and Sanjeev Mohip, Department of Biology, Loyola University Chicago, IL 60626. Tobacco mosaic virus was cultivated in nicotiana tobacum cv. Turkish and the Virus was purified with cellulose column and centrifugation technique. Assay host Phaseolus vulgaris cv. pinto was grown in the green house at 27°c temperature. Ten day old bean plants were used for the assay of the virus treated with Allium cepa extracts prepared by grinding the Allium cepa with pestle and mortar. Macerated material was passed through cheesecloth and was then centrifuged at 1000 RPM for 15 minutes. Virus was treated with equal volume of the supernatant and the treated samples were tested for inhibition of viral activity. Virus-extract samples were taken after various time intervals of incubation and used to inoculate properly prepared leaves. The latter were then incubated for three days at room temperature and under 25 ft. c. light intensity and the lesions were counted. Results indicated that the Allium cepa extract inhibited TMV replication. Inhibition varied with the method of inoculation and the method of treatment used. Eighty to 100 percent inhibition of virus replication was noted.

A NOVEL BIOASSAY FOR TOXICITY ASSESSMENT. B. Hoffman and G. Elseth, Bradley University, Peoria, IL 61625. A sensitive microbial bioassay has been developed for assessing environmental toxicity. The bioassay measures growth inhibition of Escherichia coli and makes use of an agar medium which allows the diffusion of a toxicant to occur from a disk on the surface of an agar plate, similar to the method employed in antibiotic sensitivity testing. The steps involved in the bioassay are quick and easy to perform, requiring only minimal laboratory experience, and the results are available overnight. Recent improvements on the bioassay allow it to be used for monitoring two types of toxicants: threshold toxicants, such as heavy metals, which exhibit a sigmoid dose-response, and nonthreshold toxicants, which exhibit a more gradual (e.g., hyperbolic) inhibitory effect on bacterial growth. The theoretical foundation of the bioassay is based on a pair of equations; one describing the diffusion of the toxicant on the plate and the other describing the effect of the toxicant on the growth rate constant of the indicator bacteria.

USING LINE SEGMENTS TO DEPICT CATEGORICAL SYLLOGISMS. J.V. Rauff, Millikin University, Decatur, IL 62522. Venn diagrams are a standard vehicle for illustrating categorical syllogisms. Because they rely on the intersections of planar regions, Venn diagrams are unsuitable for depicting arguments involving more than 4 categories. Line segments can easily be used to depict categorical syllogisms involving arbitrarily large numbers of categories. Line segments are pedagogically superior to Venn diagrams for depicting categorical syllogisms.

WRITING ACROSS THE CURRICULUM--HOW TO SURVIVE WRITING ASSIGNMENTS FOR LARGE SCIENCE CLASSES. J.E.Thomerson, Southern Illinois University, Edwardsville, IL 62026-1651. Use of "writing across the curriculum" techniques--detailed and directed writing assignments, formation of writing groups, peer editing and review of multiple drafts, use of class time for group work, and peer evaluation--allows writing assignments no matter how large the class, socializes the students, preserves the professor's sanity, and probably elicits more learning than the usual term paper assignment.

THE USE OF A COMPUTER AS A PLANT BREEDER IN THE TEACHING OF GENETICS. Lawrence C. Matten, Southern Illinois University at Carbondale, Carbondale, IL 62901. The basics of Mendelian genetics is founded on an understanding of probability. The average student has difficulty in visualizing crosses and percentages of offspring. The author has written and successfully used in lecture and laboratory situations a HyperCard® program that serves as a plant breeder and allows the student to relive the experience of Gregor Mendel and his pea plants. The program is designed to randomly select genotypes of parents. The user is shown the parents on the screen, forcing the user to identify the phenotypes. The user can then cross the parents and get 20 offspring showing phenotypes. The F1 offspring and/or parents can be selected for further crossing and the F2/testcross/selfcross offspring are shown. The gametes for each cross are randomized and the genotypes are retained in a hidden file. The user sees, only, the phenotypes of the parents and offspring and must determine the dominant and recessive character of each pair. This simulates what a plant breeder or genetics researcher sees in the field or laboratory. The object of the exercise is for the user(s), working alone or in groups, to determine the genotypes of the two parents. The program reports the number of correct and incorrect guesses upon request. Breeding options include: monohybrid, dihybrid, pentahybrid, linkage, and epistasis.

THE TASK IS LARGE, THE TIME IS SHORT: NURTURING AN APPRECIATION OF SCIENCE THROUGH AN HISTORICAL APPROACH. R. Troll, Augustana College, Rock Island, IL 61201. This paper is an effort to encourage teachers of introductory science courses to use the historical approach. If science education is to impart a sense of relevance of science, it must include a general survey of the processes by which the most significant current scientific ideas have reached their present state of development. No thorough understanding of a science can be acquired unless the history of its development is clearly appreciated. Historical studies of a science, exclusive of their own inherent scholarly appeal, are of immeasurable value to a better understanding of that science as a discipline, particularly at the introductory level.

AN EASY AND INEXPENSIVE HANDS-ON INVESTIGATION ON ENERGY RELATIONS DURING BIOLOGICAL SUCCESSION. W. J. Sundberg, Dept. of Plant Biology, Southern Illinois University at Carbondale, Carbondale, IL 62901. Time schedules, budgets, and other constraints often make hands-on inquiry investigation of succession and ecological energy relation principles difficult to accomplish in large laboratory classes. Using coprophilous (dung-loving) fungi and modifying a commonly employed succession investigation procedure, energy loss through non-photosynthetic metabolic activity can effectively be indirectly measured by students in a single semester. Observing, inferring, measuring, predicting, hypothesizing, and data interpretation skills can all be included. Due to the abundance of organisms that grow on dung in the self-contained experimental environment, the end result is surprising and usually requires modification of student's hypotheses. Results can be effectively used in subsequent discussions of biochemistry, ecosystem energy relations, and succession. Supplies required include a convection current drier (fruit drier or other drying apparatus), a triple beam balance, some miscellaneous grocery store items, and dung from pasture-fed horses. Students in 16 sections of a non-majors class in Plant Biology at Southern Illinois University (13 sections in the regular 15-week semester and three sections in the shorter 8-week summer session) successfully pilot tested this investigation.

THE ILLINOIS STATE MUSEUM'S INTERDISCIPLINARY SCIENTIFIC LITERACY WORKSHOPS FOR ELEMENTARY TEACHERS. B. W. Styles, Illinois State Museum, Springfield, IL 62706. Illinois State Museum scientists and educators have combined forces to train over 450 elementary teachers from across the state through a series of one-week, resident scientific literacy workshops funded by the Illinois State Board of Education. The workshops are taught by practicing scientists at the Illinois State Museum's 97,000 square foot Research and Collections Center and utilize the collections of over 8½ million specimens. The sessions emphasize the dynamic, systemic relationships between climate, geology, botany, zoology, and humans. They include a review of the nature of science and scientific methods, hands-on activities using the extensive natural history collections, and an all-day interdisciplinary field trip. Follow-up surveys with the teachers demonstrate the success of the program.

MATHEMATICAL LITERACY MEANS MANY DIFFERENT THINGS. Richard J. Maher, Loyola University Chicago, Chicago, IL. 60626.

Mathematical literacy means many different things, depending upon the particular group involved. Educational techniques, both formal and informal, are available that have been successful in meeting the needs of diverse audiences such as college students in non-technical areas, high school students planning, or not planning, on college, elementary school students, and the parents of all of the above. All these methods work at making mathematics less mysterious and more user friendly and operate under the premise that once fear is gone progress can be made. The presentation will outline several methods that have produced good results and indicate the areas in which they have been most effective.

A CROSS CULTURAL COMMUNICATION MODEL FOR MULTI-CULTURAL SCHOOLS.

R. N. Woll, N. Woll and Company, Inc., San Jose, IL 62682-0077.

Cross cultural communication skills have been taught to international personnel of global organizations routinely for some time. With the mix of cultures found in the U.S. school systems today, some of these techniques could be useful in classroom or counseling environments. A tested and proven model, originally developed within the International Business Machines corporation, will be described and related to applications in education. This model employs personality matrices and evaluation methods which will be explained.

EVIDENCE FOR DEFICIENT ACTIVITY OF ADRENAL STEROIDOGENIC ENZYMES IN MUTANT CREAM (e/e) SYRIAN HAMSTERS. A. G. Amador¹, M. Levin² and U. W. Huck², ¹Southern Illinois University, Springfield, IL 62794, and ²Sangamon State University, Springfield, IL 62794.

This study was undertaken to analyze the adrenal steroid metabolism in hamsters homozygous to the cream allele (e/e). Blood and adrenals were obtained from adult wildtype and cream hamsters. Plasma and adrenal steroid levels were measured by RIA. Adrenal weight was lower in cream than in wildtype hamsters. Adrenal progesterone and hydroxyprogesterone were elevated, whereas plasma and adrenal cortisol was reduced, and adrenal testosterone and aldosterone were unchanged in cream versus wildtype hamsters. The efficiencies of 17alpha-hydroxylase (17HL), 17-hydroxysteroid dehydrogenase (17HSD) and 21/11 hydroxylase (21/11HL) were reduced in cream hamsters when compared to wildtype hamsters. These results indicate a deficiency in the activities of 17HSD and 21/11HL, and maybe 17HL, in the adrenals of cream hamsters.

EVIDENCE FOR DEFICIENT ACTIVITY OF TESTICULAR STEROIDOGENIC ENZYMES IN MUTANT CREAM (e/e) SYRIAN HAMSTERS. A. G. Amador¹, M. Levin², U. W. Huck² and N. Angel², ¹Southern Illinois University, Springfield, IL 62794, and ²Sangamon State University, Springfield, IL 62794.

This study was undertaken to analyze the testicular steroid metabolism in hamsters homozygous to the cream allele (e/e). Blood and testes were obtained from adult wildtype and cream hamsters. Plasma and testes steroid levels were measured by RIA. Testes weight was higher in cream than in wildtype hamsters. Testicular progesterone was elevated, whereas plasma and testicular testosterone, and testicular hydroxyprogesterone were reduced in cream versus wildtype hamsters. The efficiency of 17alpha-hydroxylase (17HL) was reduced, and that of 17-hydroxysteroid dehydrogenase (17HSD) was normal in cream hamsters when compared to wildtype hamsters. These results indicate a deficiency in the activity of 17HL, and maybe 17HSD, in the testes of cream hamsters.

PAEDOMORPHIC CHARACTERS AND THEIR EFFECT ON PHYLOGENETIC ANALYSES. T. C. Grande, Field Museum of Natural History, Chicago, IL 60605. The phylogenetic relationships of gonorynchiform fishes was investigated using cladistic analysis. Two fresh water African genera, Grasseichthys and Cromeria were placed as sister taxa on the basis of a reduction in cranial osteology, loss of scales and the loss of a suprapreopercle. On the surface there appears to be several characters uniting Grasseichthys and Cromeria as a group. These characters however, may not all be independent, but instead may be the result of paedomorphosis since they consist exclusively of loss or reductive characters. The issue of paedomorphosis in systematics will be addressed using gonorynchiform fishes as a model.

ZOOPLANKTON POPULATION DYNAMICS IN TWO ACID (pH=3.0) SURFACE MINE LAKES T. Reilly and R. Brugam, Southern Illinois University, Edwardsville, IL 62026.

Zooplankton species abundances are being monitored in two acid surface mine lakes in Southern Illinois. An attempt is being made to neutralize one lake with organic matter additions in the form of cow manure. Another pit is used as a control. So far, organic loading has resulted in no discernible changes in the lakes. The two major species present in both lakes are Brachionus urceolaris and Scapholebris kingi. S. kingi dominates in summer and B. urceolaris is abundant in winter. Other investigators have found that S. kingi populations respond strongly to variations in photoperiod. Our results are consistent with this interpretation.

COMPETITIVE EXCLUSION IN SPECIES GROUP THORACICA OF THE GENUS TRIPLAX (COLEOPTERA: EROTYLIDAE). M. A. Goodrich, Department of Zoology, Eastern Illinois University, Charleston, IL 61920. Two species of Triplax, Triplax flavicollis Lacordaire and Triplax thoracica Say, occur commonly throughout the state of Illinois in association with the gill fungus Pleurotus ostreatus. Adults of both species are frequently found together in the same basidiocarps, in apparent violation of the "competitive exclusion principle." Data on over 2,000 adults of these species from east-central Illinois indicate a substantial temporal partitioning of this food resource as a result of a significant difference in seasonal frequency of occurrence. Larvae of both species are also exclusively found feeding on Pleurotus and rearing studies show a still greater seasonal partitioning of the larval habitat.

A FAUNAL STUDY OF THE GENUS OXYPORUS (COLEOPTERA: STAPHYLINIDAE: OXYPORINAE) IN ILLINOIS. R. S. Hanley and M. A. Goodrich, Department of Zoology, Eastern Illinois University, Charleston, IL 61920. The Staphylinid subfamily Oxyporinae consists of the genus Oxyporus with two subgenera, Oxyporus and Pseudoxyporus. The nine Oxyporus species known to occur in Illinois are reviewed and their seasonal occurrence and known fungal hosts are discussed. The species occurring in Illinois are Oxyporus femoralis femoralis, O. lateralis, O. lepidus, O. major, O. occipitalis, O. rufipennis, O. stygicus, O. vittatus, and O. quinquemaculatus, the last species being reported from Illinois for the first time.

MECHANISMS OF AGGREGATION IN THE IMPORTED WILLOW LEAF BEETLE. M.L. Crowe, Northern Illinois University, DeKalb, IL 60115. The mechanisms used in reaggregation of nonsocial insect larvae are poorly understood. Using four-day old (gregarious) and eight-day-old (solitary) larvae, I investigated the roles that leaf quality, presence of conspecifics, chemicals left by conspecifics, and light play in reaggregation in the imported willow leaf beetle. Larvae that were four-days-old selected both young and old leaves occupied by conspecifics more often than they selected unoccupied leaves. Eight-day-old larvae did not prefer occupied over unoccupied leaves. Both four-day-old and eight-day-old larvae given a leaf/excrement trail tended to select the leaf the trail led to. Four-day-old larvae in the dark were less likely to move and reaggregate than larvae in the light. There was no difference between movement or reaggregation of eight-day-old larvae in the dark or in the light.

MATURATION-RELATED DECREASE OF STEROID LEVELS IN THE ADRENALS OF MALE WOODCHUCKS (*Marmota monax*). A. G. Amador¹ and A. Woolf², Southern Illinois University, ¹Springfield, IL 62794, and ²Carbondale, IL 62901.

Little is known about endocrine function in woodchucks. Since stress plays an important role in the survival of any wild animal, the understanding of the physiology of the adrenal becomes paramount. Thus, the effect of maturation on the levels of steroids in the adrenal of one- and two-year old male woodchucks was studied. At sacrifice, the adrenals of wild-caught woodchucks were obtained. Adrenals were homogenized, and steroid levels were determined by solid-phase RIAs characterized to be accurate in these samples. The adrenal levels of progesterone, hydroxyprogesterone, testosterone, cortisol and aldosterone were all significantly lower ($P < 0.025 - < 0.0005$) in two-year old than in one-year old woodchucks. The present results could indicate greater requirements for adrenal steroids during the maturational phase, than at later stages of life, in the woodchuck.

EVIDENCE DOSE- AND TIME-DEPENDENT REGULATION OF TESTICULAR ESTRADIOL METABOLISM BY hCG. A. G. Amador¹ and A. Mayerhofer², ¹Southern Illinois University, Springfield, IL 62794, and ²Universitaet Ulm, Ulm, Germany.

This study was undertaken to determine if testicular estradiol (E₂) metabolism is differentially affected by the protocol of hCG administration. Adult mice were injected with different doses of hCG, and sacrificed 24 or 72 h later. Testes fragments were incubated with hCG, and media steroids were measured by RIA. The effects of hCG on testicular E₂ metabolism depended on the dose of hCG, and time between injection and sacrifice. Incubation with hCG elevated media E₂ levels in mice. However, when mice were injected with hCG at doses >0.1 IU/g BW, incubation with hCG, 24h later, did not increase media E₂ levels. If the incubation with hCG was done 72h after the injection of hCG, then the effect of *in vitro* hCG was not affected. These results indicate that the regulation of the testicular E₂ metabolism, by hCG, is dose- and time-dependent.

EVIDENCE FOR SPECIES-SPECIFIC REGULATION OF TESTICULAR ESTRADIOL METABOLISM BY hCG. A. G. Amador¹ and A. Mayerhofer², ¹Southern Illinois University, Springfield, IL 62794, and ²Universitaet Ulm, Ulm, Germany.

This study was undertaken to determine if testes estradiol (E₂) metabolism, including aromatase (AROM) efficiency, is differentially regulated in different species. Adult mice, rats and Syrian hamsters were injected with different doses of hCG, and sacrificed 24h later. Testes fragments were incubated with hCG, and media steroids were measured by RIA. Media E₂ levels were highest in mice and lowest in hamsters. Incubation with hCG increased E₂ in mice and rats, and injection with hCG elevated E₂ only in rats. In mice, incubation with, or injection of hCG decreased AROM efficiency. Combination of both treatments counteracted each others effect. In hamsters, use of hCG always decreased AROM efficiency, and in rats it had no effect. These results indicate that the regulation of the testicular E₂ metabolism, by hCG, is species-specific.

INTERACTION OF THIDIAZURON WITH OTHER CYTOKININS IN RELATION TO THE REGENERATION OF AMERICAN ELMS FROM LEAF TISSUES. P. A. Herman and M. G. Bolyard, Southern Illinois University at Edwardsville, Edwardsville, IL 62026.

American elm leaf sections were cultured on Murashige and Skoog basal medium containing combinations of thidiazuron and other cytokinins. Initial experiments utilized 0.1 μM thidiazuron with 1 μM 6-benzyladenine, zeatin, kinetin, or pyranil benzyladenine. Numbers of callus producing shoots, as well as a qualitative analysis of callus production, indicated that thidiazuron and 6-benzyladenine produced an additive effect on shoot regeneration, while thidiazuron and kinetin produced a synergistic effect. A second set of cultures have been initiated to test various concentrations of 6-benzyladenine or kinetin with thidiazuron. Thidiazuron may affect American elms in culture through a cellular receptor which is different from that which recognizes other cytokinins. This will be evaluated by testing 6-benzyladenine or kinetin in competition with zeatin (which had no effect on regeneration frequencies).

EFFECT OF ETHYLENE ON ONION BULB LEAF BASE EPIDERMAL NUCLEAR AND NUCLEOLAR MACROMOLECULES. P.K. Bhattacharya, Indiana University Northwest, Gary, IN 46408; C.S. Karagiannis and A.J. Pappelis, Southern Illinois University, Carbondale, IL 62901. Outer epidermal cells from the equatorial region of the third turgid onion leaf base (Allium cepa; yellow, Sweet Spanish) were treated (excised pieces 0.5 x 0.5cm) with $10^{-5}M$ ethylene (E) to activate minor nucleolar organizer regions, E with $10^{-5}M$ cobalt chloride (ethylene inhibitor = Co), Co, and water (control). E induced the appearance of minor nucleoli and enlargement of major nucleoli (three hours treatment = T-3). In water at T-3, only major nucleolar enlargement occurred. Co inhibited the effects of E and water. Nuclear DNA and histone protein did not change in any treatment (T-3 compared to T-0, the starting time). However, nuclear RNA and non-histone protein (nHP) increased in E (RNA = 161% and nHP = 169% of T-0 at T-3). For Co at T-3, RNA = 104% and nHP = 111%. For E + Co at T-3, RNA = 110% and nHP = 120%. For water at T-3, RNA = 132% and nHP = 134%. We infer that ethylene activated minor nucleolar cistrons and stimulated rRNA, mRNA, and nHP synthesis.

OPTIMAL IN VITRO CONDITIONS FOR RAT COAGULATING GLAND TRANSGLUTAMINASE (CGTGASE) R.E. Beil and B.L. Johnson, Chicago State Univ., Chicago, IL 60628. Rat CGtgase catalyzes the coagulation of seminal vesicle proteins (SVP) and formation of the vaginal plug. The in vitro effects on CGtgase of varying cofactor (Ca^{++} and polyanion) and substrate concentrations and pH have not been reported. Assays were based on Tgase ability to covalently link ^{14}C -putrescine to glutamyl residues in proteins. Maximum activity was attained in the presence of 1.25 mM Ca^{++} and 40 $\mu g/ml$ polyaspartate (other polyanionic substances are also effective - BBRC:79/4 '77). PH was varied over a range of 5 to 9 with activity increasing with increased pH. The V_{max} was 6.02 mg SVP/ml when CG protein was 1.55 mg/ml and SVP ranged from 0 to 15 mg/ml. CGtgase was more reactive with SVP than with fibrinogen (8 fold) and casein (5 fold). Polyaspartate accelerated CGtgase with SVP but not with fibrinogen or casein. Guinea pig liver tgase (Sigma Chem.) was more reactive with casein than SVP and equally active with fibrinogen and SVP. These results establish in vitro conditions for working with rat CGtgase. (Supported by NIH/MBRS grant GM08043-22)

GEOLOGY OF THE WALTERSBURG $7\frac{1}{2}'$ QUADRANGLE, POPE COUNTY, ILLINOIS. C. P. Weibel, Illinois State Geological Survey, Champaign, IL 61820. The Waltersburg $7\frac{1}{2}'$ Geological Map is one of a series of maps prepared under the Cooperative Geologic Mapping Program (COGEOMAP), which is jointly supported by the USGS and the ISGS. Mapped Mississippian-age units consist primarily of alternating carbonates and fine-grained clastics. Pennsylvanian-age units consist primarily of thick sandstones. Northeast-trending faults related to Hicks Dome are the predominant structural features. Comparison of this map with a map compiled by Weller and Krey (1939) on a 15' base indicates that only the current map provides necessary data for multiple uses. Such detailed geologic maps are essential for land use planning programs, for assessment of geologic hazards, and for exploration for resources, including ground-water.

QUESTIONNAIRING UNIVERSITY STUDENTS IN BIOLOGY ON EMERGENCE AND EVOLUTION OF LIFE. Aristotel Pappelis and Sidney W. Fox, Department of Plant Biology, Southern Illinois University, Carbondale, IL 62901. We have each taught courses in emergence (molecular origin) and evolution of life stressing the "synthetic", forward (determined) rather than the "analytical", backward (random) direction. In recent classes at SIU-C (3 classes of Cell Biology; 2 classes of History of Biology; 1 class of Introductory Biology for non-science majors) we questionnaired (22 questions) students (n = 460) and found that about 60% recognized that protolife (protocells = microspheres of thermal proteins) has already been created in the laboratory. About 70% believe that the Universe began from a determined bias that most people call God(s), that the Universe is real (97%), everything in the Universe including life obeys physical and chemical laws (60%), in the "fixity" of species (15%), that it is sacrilegious to try to solve the problems of emergence of life in the laboratory (23%), that both science and creation versions of the origin and evolution of life should be taught in public schools and universities (74%), in the concept of the miraculous origin of cellular life (60%), and that scientists who experiment with the synthetic retracement of the emergence of life will eventually contribute richly to identifying new biological processes and a new philosophy (84%).

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OUTCOMES OF A CONFERENCE FOR ILLINOIS TEACHER-LEADERS IN MATHEMATICS, SCIENCE, AND TECHNOLOGY EDUCATION. W. J. Sundberg, Dept. of Plant Biology, Southern Illinois Univ. at Carbondale, Carbondale, IL 62901 (For: Conference Planning Committee Co-Chairs: M. B. Bardeen, Fermi National Accelerator Laboratory, Batavia, IL, E. F. Jason, Southern Illinois Univ. at Edwardsville, Edwardsville, IL, and M. Lisowski, Eastern Illinois Univ., Charleston, IL). Principal investigators (PI's) of National Science Foundation Teacher Enhancement Programs in Illinois urge that statewide educational improvement initiatives combine resources and build on experiences of successful programs. Thirty PI's sought advice of and collaborated with 60 NSF teacher enhancement program "graduates" via a Conference for Illinois Teacher-Leaders to produce a "Framework for Illinois Science and Mathematics Teacher Enhancement Efforts" with these goals: (1) develop a network in Illinois to facilitate and encourage communication among teachers and related professions, (2) enhance professional development of teachers' knowledge, attitudes, and classroom practices related to content, pedagogy, and assessment strategies, (3) involve teachers in planning, developing, and implementing mathematics, science, and technology curricula that meet individual student needs to function in an ever-increasing technological and global society, (4) require each school district implement appropriate alternative assessment plans including but not limited to performance-based methods, (5) establish logistical support for change at the school level, and (6) promote collaboration, planning efforts and partnerships between schools and their communities. The Action Plan developed, related to goals above and including objectives and actions at three levels--Local Actions, Program Provider Actions, and State Actions--will be presented.

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"MAMMALSTACK": AN INTERACTIVE MAMMALOGY STUDY GUIDE FOR MACINTOSH COMPUTERS. J. O. Humphrey and G. A. Feldhamer, Department of Zoology, Southern Illinois University, Carbondale, IL 62901. The program is based on HyperCard, includes various study options for lecture or laboratory materials, and may be easily modified to fit specific needs of an instructor. Current options include six study categories. The first is a review of all extant mammalian orders, selected families, genera and species. The second option is a quiz (select from multiple choice, true-false, short answer) on the mammalian orders. The third option reviews bones of the skull; the fourth option is a quiz on skull bones. A glossary of 108 mammalogy terms makes up the fifth option, with the sixth study option a quiz on terminology. Again, the program may be easily modified to include additional or different lecture or laboratory material.

GRAND CANYON RATTLESNAKE (*CROTALUS VIRIDIS ABYSSUS*):
 COMPARISON OF ENZYMATIC VARIABILITY WITH OTHER *CROTALUS VIRIDIS* SUBSPECIES. S. R. Vogt and D. M. Miller, Southern Illinois University, Carbondale, IL 62901-3512. Venoms of five *Crotalis viridis* subspecies were compared with respect to total protein, protease hemolytic and phospholipase activity. Hemolytic activity was highly variable in the *C. viridis* subspecies. Moreover, the ability to lyse red blood cells did not correlate well with phospholipase content. *C. v. abyssus* showed high hemolytic activity while containing very little, if any, phospholipase. It is speculated that the Direct Lytic Factor or something similar may be present in the venom of the Grand Canyon Rattlesnake.

ENVIRONMENTAL PRESSURES AND THE OPTIMAL FORAGING THEORY. J.L. Kriz and D.M. Jedlicka. Joliet Junior College, Joliet IL 60434 and University of Illinois at Chicago, Chicago IL 60680. In the field of ecology there is a theory referred to as Optimal Foraging Theory (OFT). OFT states that for a given behavioral trait there is a range of strategies for expressing that behavioral trait with each strategy having a specific level of efficiency. Out of this range, though, there is a single strategy which is the most efficient and due to environmental pressures this strategy will be the only strategy expressed.

What if those environmental pressures are variable due to evolutionary lags or position in the food chain? If it is possible then more than one strategy can exist for a behavioral trait. In fact all strategies above the minimum survival level dictated by the environmental pressures will exist.

SEASONAL DIFFERENCES IN CENTRAL PLACE FORAGING OF TWO SCIURID RODENTS. D.M. Jedlicka, University of Illinois at Chicago, Chicago IL 60680. Two Central Place Foragers, the eastern chipmunk (*Tamias striatus*) and the thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*) showed different foraging patterns between seasons. Manipulated food patches were placed at the central place, and 2, 4, and 6 meters from the central place. Patches were given a known volume of sunflower seeds. Foragers left a patch when the costs of foraging there outweigh the benefits. The seeds remaining in the patch after it has been foraged are called the Giving Up Density (GUD); the GUD represents the forager's assessment of the patch. During the summer, both species forage trays which are closer to the central place to a lower GUD than trays further away. In the fall, the eastern chipmunk continues to forage in this manner. The thirteen-lined ground squirrel, however, curtails foraging at the near patches and do not forage in the far patches. These foraging behaviors are related to the different hibernation strategies employed by these rodents.

ROSTER OF OFFICIALS OF THE ILLINOIS STATE ACADEMY OF SCIENCE

August 1992

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 Springfield, Illinois 62706
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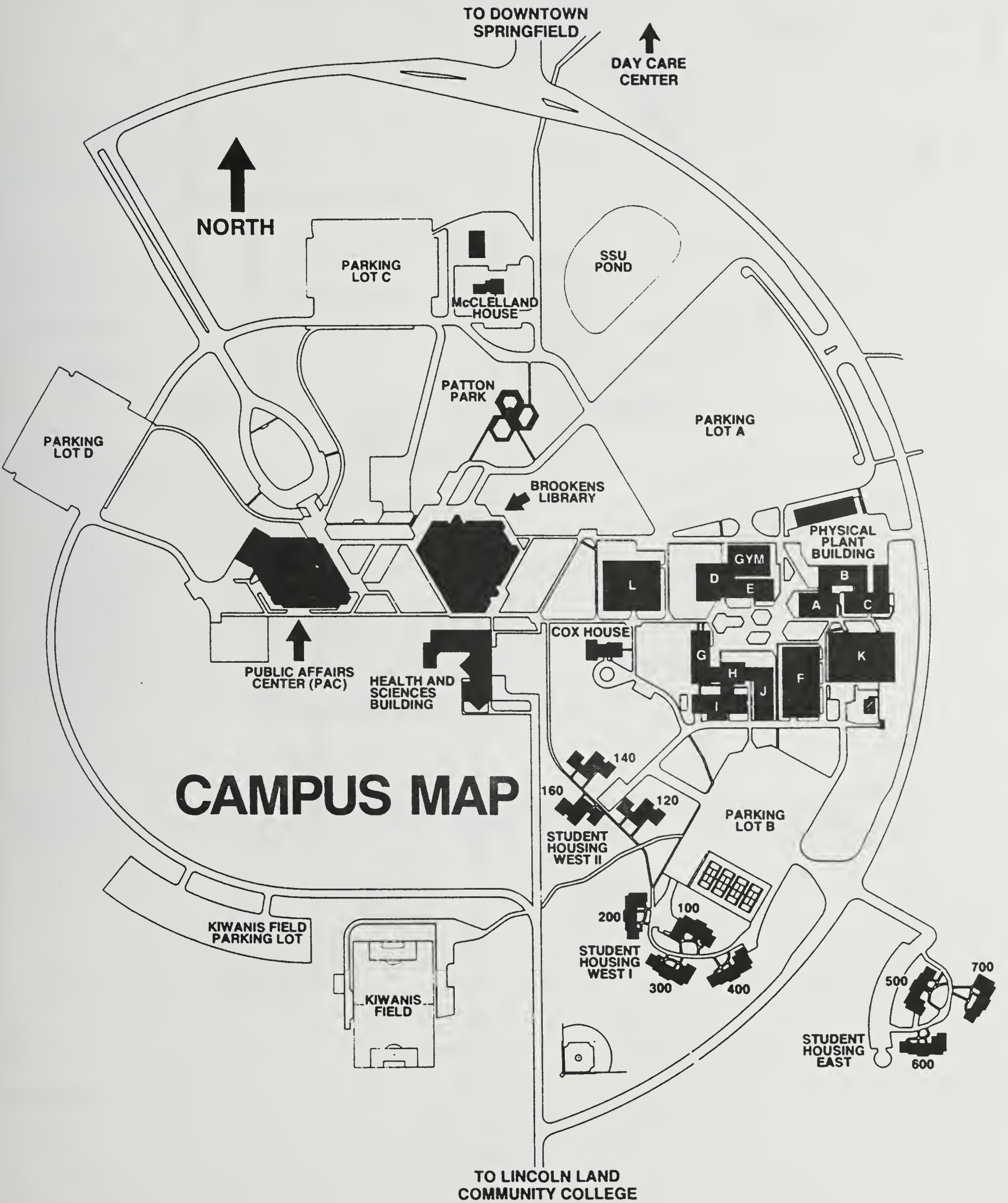
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FUTURE MEETINGS

16-17 October 1992: Illinois State Museum, Springfield
15-16 October 1993: Southern Illinois University at Carbondale
 1994: Knox College, Galesburg
 1995: Eastern Illinois University, Charleston



CAMPUS MAP

City of Springfield

Main Thoroughfares



Capital Airport

To Peoria

To Champaign

To Chicago

To New Salem
TO CLAYVILLE

Springfield College
In Illinois

North Grand Avenue

Jefferson Street

Train Station

Washington Street

Monroe Street

Clear Lake Avenue

Capitol Avenue

Downtown Center

Illinois State Museum

State Capitol

Edwards

Spring

Second

South Grand Avenue

Old Jacksonville Road

MacArthur

Fifth Street

Sixth Street

Ninth Street

Taylor Avenue

Bus Station

Dirksen Pkwy.

To Taylorville

US 36

ILL 215

Wabash Avenue

Stevenson Drive

City 66

To Jacksonville

South Bypass

Hozel Dell Road

West Lake Shore Drive

Songmon State University

To Corlinville

Lincoln Land Community College

Toronto Road

To St. Louis



ILLINOIS STATE ACADEMY OF SCIENCE

SCIENCE LITERACY: STRATEGIES FOR SURVIVAL

Illinois State Museum and Sangamon State University, Springfield

October 16-17, 1992

Annual Meeting Registration Form

(Please type or print)

Name _____

Last

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Mailing Address _____

Street

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State

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Affiliation _____

Membership Status: Regular Member _____ Student Member _____
Honorary Member _____ Life Member _____
Emeritus Member _____ Non-Member _____
Membership Information Requested _____

Pre-Registration Fees: (Note: This form may be photocopied if more than one registration is submitted)

ISAS Members [On Site \$25.00] _____ @\$20.00 \$ _____

ISAS Student [On Site \$12.50] _____ @\$10.00 \$ _____

Non-Member [On Site \$40.00] _____ @\$30.00 \$ _____

Academy Luncheon (Important Annual Meeting Follows) _____ @\$10.00 \$ _____

Academy Banquet (Meeting Registrants) _____ @\$25.00 \$ _____

Academy Banquet (Student Registrants) _____ @\$20.00 \$ _____

Academy Banquet (Non-Registrant Guests) _____ @\$35.00 \$ _____

(Includes State Museum Poster Session, Reception, Banquet, and Keynote Speaker)

TOTAL (Payment must accompany form) \$ _____

Pre-registration forms must be received by the Treasurer no later than **October 8, 1992**. Please make checks payable to the **ILLINOIS STATE ACADEMY OF SCIENCE**. Address correspondence to:

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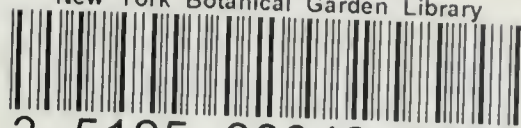
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