

# JOURNAL

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Abstract and Index Issue

Shyamal K. Majumdar, Ph.D.

Editor

Department of Biology

Lafayette College

Easton, PA 18042-1778

## 79th Annual Meeting

of the

### PENNSYLVANIA ACADEMY OF SCIENCE

Friday, April 4 to Sunday, April 6, 2003

*Holiday Inn*

*Grantville, Pennsylvania*

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## PAS PRESIDENT'S MESSAGE

**DR. CLARENCE J. MURPHY***President*

Pennsylvania Academy of Science

*Welcome**to the**79th Annual Meeting**of the**Pennsylvania Academy of Science*

I am very pleased to welcome you to the 79th Annual Meeting of the Pennsylvania Academy of Science at the Holiday Inn Conference Center, Grantville, Pennsylvania, April 4–6, 2003.

This year's conference returns once again to the Harrisburg-Hershey Region of Pennsylvania. The scientific and technical program sessions feature over 180 papers covering 24 different disciplines, including one devoted to science and religion. In addition to the technical sessions, a number of vendors will take this opportunity to exhibit their products at the annual meeting. Please visit the exhibits and thank the exhibitors for their support of the Pennsylvania Academy of Science.

On Friday evening, April 4, the plenary lecture will be delivered by Dr. Mark Monmonier, Distinguished Professor of Geography at Syracuse University. His timely presentation is entitled "How to Lie with Maps."

This meeting also sadly marks the first in many years that Dr. E. Willard Miller will not be a participant. Dr. Miller who was president of the Pennsylvania Academy of Science from 1967–1969, coeditor of many of the PAS books and a frequent contributor to the Journal passed away on November 15, 2002 at the age of 87.

Lastly I would like to thank all those who have devoted time, energy and expertise to make this annual meeting possible. Personally and on behalf of the Annual Meeting Committee, I invite you to meet with your colleagues, increase your scientific knowledge, participate in discussions and above all enjoy your stay at the meeting.

With best wishes,

Dr. Clarence J. Murphy, President  
Pennsylvania Academy of Science  
Department of Chemistry (Emeritus)  
East Stroudsburg University of Pennsylvania  
East Stroudsburg, PA

## A MEMORIAL TRIBUTE TO DR. E. WILLARD (WILL) MILLER

**E. WILLARD MILLER, Ph.D.***Served as President of the Pennsylvania Academy of Science 1967–1969*

Dr. E. Willard Miller, former President and Book Co-Editor of the Pennsylvania Academy of Science (PAS), passed away on November 15, 2002 in State College, PA. He is survived by his wife Ruby S. Miller.

Dr. Miller received his M.A. from the University of Nebraska in 1939 and a Ph.D. from the Ohio State University in 1942. Dr. Miller served as Professor and Head of the Geography Department, and was named Assistant Dean and then Associate Dean for Resident Instruction at the Pennsylvania State University, University Park, PA. He retired in 1980. Dr. Miller was an authority on minerals and environmental problems.

Dr. Miller served as President of the PAS (1967–69), co-edited 25 Academy sponsored books and wrote numerous articles for the Academy's newsletter. Will, along with his wife Ruby, established the "Willard and Ruby Book Endowment Fund" to aid the book publication activities of the PAS. Professor Miller also wrote numerous text books, bibliographies and reference books; many of these were in collaboration with his wife, Ruby S. Miller. In 1948, he was elected President of the American Society for Professional Geographers and in 1962, served as President of the Pennsylvania Geographical Society.

Dr. Miller was a dedicated educator, an established scholar and an enthusiastic explorer. He received many prestigious awards, which attest to his contributions and meritorious service to the State and the Nation. He received the George C. and Kathryn Shoffstall award from the PAS, the Honors award from the Association of American Geographers and the Scholars award from the Pennsylvania Geographical Society. Dr. Miller also received honorary doctorates from the Ohio State University and Clarion University. He was a Fellow of the American Association for the Advancement of Science, the Explorer Club, the American Geographical Society and the Council for Geographic Education.

Dr. E. Willard Miller was a devoted, dedicated and faithful member of the PAS. His contributions to the PAS were exceptional and the Academy has been well served by him. The Pennsylvania Academy of Science will miss Dr. Miller’s presence.

Editor’s Note: Dr. Miller co-edited 25 PAS books with me and other invited editors. I have learned much from Will, and his expertise was invaluable to the success of the book publication activities of the PAS. It was a privilege to have known him so well, and I will never forget Dr. Miller’s thoughtfulness and kindness. He was a good friend and I will feel his loss.

Shyamal K. Majumdar  
Editor – Journal & Books

*Note: Some information was gathered from the Center Daily Times, PA, November 25, 2002.*

SCHEDULE OF ACTIVITIES AT A GLANCE

79th Annual Meeting  
of the Pennsylvania Academy of Science  
April 4–6, 2003  
Holiday Inn • Grantville, PA

Friday, April 4		Room
1:00 PM	Board of Director’s Meeting	Congressional Suite
3:00 - 8:00 PM	Registration	Lobby
6:30 - 8:00 PM	Dinner	Grand Ball Room
8:15 PM	Plenary Lecture: “How to Lie with Maps” Dr. Mark Monmonier, Syracuse University	Grand Ball Room
Saturday, April 5		Room
7:30 - 9:00 AM	Breakfast	Winners Circle Saloon
8:30 - 11:00 AM	Registration	Lobby
9:00 - 5:00 PM	Exhibits	Royale 1, 2, 3
9:00 - 12:00 NOON	Paper Presentations	Congressional Suite Regency Suite Pennsylvania Suite
8:45 - 12:00 NOON	I Ecology	
	II Cell Biology, Molecular Biology, Genetics	
	III Chemistry, Geology, Geography, Meteorology, Physics/Math	
9:00 - 11:30 AM	Poster Session I Cell Biology, Molecular Biology, Genetics, Forensics	Royale 1, 2, 3
10:00 - 10:30 AM	Coffee Break	Foyer
12:00 - 1:15 PM	Lunch	Winners Circle Saloon

1:15 - 5:00 PM	<b>Paper Presentations</b> IV Environmental Science, Aquatic Biology, Behavioral Biology V Education, Cell Biology, Molecular Biology, Genetics VI Microbiology, Immunology, Medicine, Science & Religion	Congressional Suite Regency Suite Pennsylvania Suite
1:30 - 4:00 PM	<b>Poster Session II</b> Aquatic Biology, Botany, Biochemistry, Microbiology, Immunology, Medicine, Physiology, Psychobiology, Engineering, Education	Royale 1, 2, 3
2:30 - 3:00 PM	Coffee Break	Foyer
5:00 PM	Business Meeting	Congressional Suite
5:00 - 6:30 PM	Social Hour (Cash Bar)	Garden Grill Café
6:30 - 8:00 PM	Dinner	Grand Ball Room
8:15 PM	Mixer (Country Entertainment)	Winners Circle Saloon

Sunday, April 6		Room
7:30 - 9:00 AM	Breakfast	Winners Circle Saloon
8:30 - 10:00 AM	Registration	Lobby
8:30 - 11:00 AM	<b>Paper Presentations</b> VII Zoology VIII Botany, Entomology, Parasitology IX Invasive Species Symposium	Congressional Suite Regency Suite Pennsylvania Suite
8:30 - 11:00 AM	<b>Poster Session III</b> Ecology, Zoology, Phycology, Environmental Science, Toxicology, Geology	Regency Suite 1, 2, 3
10:00 - 10:30 AM	Coffee Break	Grand Circle Saloon
11:00 AM	Board of Director's Meeting	Congressional Suite

**PROGRAM SESSIONS**  
  
*79th Annual Meeting  
of the Pennsylvania Academy of Science  
Holiday Inn, Grantville, PA  
April 4-6, 2003*

<b>SATURDAY, APRIL 5</b>  <b>9:00 AM - 12:00 NOON</b> <b>Session I</b> <b>ECOLOGY</b> <b>Congressional Suite</b> <b>Robert Coxe, Session Chair</b>  <b>9:00-9:15</b> 1. NICHE PARTITIONING AND THE COEXISTENCE OF SIMILAR SPECIES: AN EVALUATION OF THE DIET OF THREE SPECIES OF <i>AMBYSTOMA</i> LARVA. <b>Joseph J. Wilson</b> <sup>1*</sup> and <b>Timothy J. Maret</b> <sup>2</sup> ( <sup>1</sup> Gannett Fleming, Inc., <sup>2</sup> Shippensburg University).  <b>9:15-9:30</b> 2. STATUS OF QUEEN CONCH ( <i>STROMBUS GIGAS</i> ) POPULATIONS OFF OF ANDROS ISLAND, THE BAHAMAS AND AN ASSESSMENT OF THE PROBABLE EFFECTIVENESS OF RECENTLY ESTABLISHED MARINE REPLENISHMENT ZONES. <b>John A. Cigliano</b> <sup>1*</sup> and <b>Bryan S. Bugler</b> <sup>2</sup> ( <sup>1</sup> Cedar Crest College, <sup>2</sup> Massachusetts).  <b>9:30-9:45</b> 3. MYCORRHIZAL ASSOCIATIONS BETWEEN CANOPY WHITE OAK ( <i>QUERCUS ALBA</i> ) AND UNDERSTORY DOGWOOD ( <i>CORNUS FLORIDA</i> ) TREES: EXPLORING THE LINK. <b>Karen Buerdsell</b> <sup>*</sup> and <b>Brad E. Engle</b> (Wilson College).  <b>9:45-10:00</b> 4. HABITAT USE OF BLUE-HEADED VIREOS. <b>Beth A. Swartzentruber</b> <sup>*</sup> and <b>Terry L. Master</b> (East Stroudsburg University).  <b>10:00-10:30 BREAK</b>  <b>10:30-10:45</b> 5. DIRECT AND INDIRECT EFFECTS OF ACIDIFICATION ON AMPHIBIANS AND THEIR INVERTEBRATE PREDATORS. <b>Jamie M. Zambo</b> <sup>*</sup> and <b>Timothy J. Maret</b> (Shippensburg University).	<b>10:45-11:00</b> 6. BASELINE BIODIVERSITY SURVEY OF MAMMALS IN A MEADOW HABITAT AT THE ACOPIAN CENTER FOR CONSERVATION LEARNING AT HAWK MOUNTAIN SANCTUARY. <b>Karen Nowicki</b> <sup>*</sup> and <b>John A. Cigliano</b> (Cedar Crest College).  <b>11:00-11:15</b> 7. GEOBOTANICAL RELATIONSHIPS AT CHICKIES ROCK COUNTY PARK (S.E. PA) AND THE COMPLICATING LEGACY OF ROADBUILDERS. <b>Jonathan L. Richardson</b> <sup>*</sup> , <b>Ruwani Bandaranayake</b> and <b>Christopher Sneeringer</b> (Franklin and Marshall College).  <b>11:15-11:30</b> 8. A NATURAL HERITAGE INVENTORY OF MERCER COUNTY, PA. <b>Robert B. Coxe</b> <sup>*</sup> (Western Pennsylvania Conservancy).  <b>11:30-11:45</b> 9. GENETIC ANALYSIS OF POPULATION STRUCTURE OF VERNAL POND AMBYSTOMATID SALAMANDERS. <b>Amy M. Daniels</b> <sup>*</sup> , <b>Marcie L. Baer</b> and <b>Timothy J. Maret</b> (Shippensburg University).  <b>11:45-12:00</b> 10. COMPARISON OF THE SMALL MAMMAL COMMUNITY BETWEEN A FOREST FRAGMENT AND AN ABANDONED CHRISTMAS TREE FARM AT THE ACOPIAN CENTER FOR CONSERVATION LEARNING AT HAWK MOUNTAIN SANCTUARY (KEMPTON, PA). <b>Elizabeth Roessner</b> <sup>*</sup> and <b>John A. Cigliano</b> (Cedar Crest College).
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<b>SATURDAY, APRIL 5</b>  <b>9:00 AM - 12:00 NOON</b> <b>Session II</b> <b>CELL BIOLOGY, MOLECULAR BIOLOGY AND GENETICS</b> <b>Regency Suite</b> <b>Dr. Jeffrey Newman, Session Chair</b>  <b>9:00 - 9:15</b> 11. REGULATION OF THE INSULIN-RECEPTOR
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\*Represents author presenting the paper.

SUBSTRATE GENE (CHICO) DURING REPRODUCTIVE-DIAPAUSE TERMINATION IN *DROSOPHILA MELANOGASTER*. **Angela Ellerman\***, **Brandi Swietkoski** and **David S. Richard** (Susquehanna University).

#### 9:15-9:30

12. FUNCTIONAL ANALYSIS OF THE SIGB PROMOTER IN SYNECHOCOCCUS SP. STRAIN PCC 7002. **Cheryl Christianson\*** and **Laurie Caslake** (Lafayette College).

#### 9:30-9:45

13. EXPRESSION OF HUMAN FGAR AMIDOTRANSFERASE IN *E. COLI*. **Marla Yates\*** and **Jeffrey D. Newman** (Lycoming College).

#### 9:45-10:00

14. GROWTH INHIBITORY RESPONSE OF MOUSE MAMMARY CARCINOMA CELLS TO ANASTROZOLE. **Julie M. Xanthopoulos\***, **Farahleena S. Laiwalla** and **Shyamal K. Majumdar** (Lafayette College).

#### 10:00-10:30 BREAK

#### 10:30-10:45

15. DEVELOPMENT AND CHARACTERIZATION OF TRANSGENIC MICE EXPRESSING AND ANTIZYME IN THE INTESTINE AND COLON. **Bradley D. Confer<sup>1\*</sup>**, **David J. Feith<sup>2</sup>** and **Anthony E. Pegg<sup>2</sup>** (<sup>1</sup>Elizabethtown College, <sup>2</sup>The Penn State University College of Medicine).

#### 10:45-11:00

16. DIFFERENTIATION AND CHARACTERIZATION OF THE MURINE OLIGODENDROCYTIC CELL LINEAGE IN VITRO UTILIZING ULTRASTRUCTURAL AND HISTOCHEMICAL TECHNIQUES. **Erin Fotter\*** and **M. Dana Harriger** (Wilson College).

#### 11:00-11:15

17. SELENIUM INDUCED APOPTOSIS IN TWO DIFFERENT CANCER CELL LINES. **Shirley A. Satuh\***, **Alissa E. Romano** and **Shyamal K. Majumdar** (Lafayette College).

#### 11:15-11:30

18. MICROARRAY ANALYSIS OF GENE EXPRESSION IN *DROSOPHILA MELANOGASTER* OVARIES FOLLOWING TREATMENT WITH JUVENILE HORMONE OR ECDYSTEROIDS. **Kathryn E. Herman\*** and **David S. Richard** (Susquehanna University).

#### 11:30-11:45

19. DISCERNING PALATES: CAN LARVAE "TASTE" BT ENDOTOXINS? **Rebecca L. Stankiewicz Gabel\*** (Shippensburg University).

#### 11:45-12:00

20. SEQUENCING MITOCHONDRIAL CONTROL REGION FOR USE AS A GENETIC MARKER IN

GEESE. **Page Tobelmann\***, **Josh C. Snyder**, **Fred J. Brenner** and **Durwood B. Ray** (Grove City College).

### SATURDAY, APRIL 5

#### 8:45 AM - 12:00 NOON

##### Session III

**CHEMISTRY, GEOLOGY, GEOGRAPHY, METEOROLOGY AND PHYSICS/MATHEMATICS**  
**Pennsylvania Suite**  
**Dr. William Kory, Session Chair**

#### 8:45-9:00

21a. REAL TIME GLOBAL OBSERVATION AND MONITORING OF NATURAL ENVIRONMENTAL HAZARDS - CASE STUDIES. **Assad I. Panah\*** (University of Pittsburgh at Bradford)

#### 9:00-9:15

21. ORGANIC SYNTHESIS OF PRADIMICIN A — A POTENT MANNAN-BINDING ANTIFUNGAL AGENT. **Julianne M. Yost\*** and **Paul M. Sherblom** (Cedar Crest College).

#### 9:15-9:30

22. IDENTIFYING THE BOLIVIAN ITURRALDE FEATURE AS A COMPLEX SOFT SEDIMENT IMPACT CRATER. **Sandra A. Holmes\*** and **Sara Brown** (Messiah College).

#### 9:30-9:45

23. SOFTWARE DEVELOPED FOR NEAR-REAL-TIME INTERNET SEISMIC SIGNALS. **Joseph J. Gerencer, Jr.<sup>1\*</sup>** and **Michael Sands<sup>2\*</sup>** (<sup>1</sup>Moravian College, <sup>2</sup>Essent Corporation).

#### 9:45-10:00

24. SIMILARITY AND DIFFERENCES BETWEEN INTRAPLATE AND INTERPLATE VOLCANOES. **Madan Varma** (Kutztown University).

#### 10:00-10:30 BREAK

#### 10:30-10:45

25. PENNSYLVANIA'S CITIES — GROWTH AND DECLINE: 1990 TO 2000. **William B. Kory\*** (University of Pittsburgh at Johnstown).

#### 10:45-11:00

26. THE DEMOGRAPHIC STATUS OF NATIONS AT THE END OF THE 20<sup>TH</sup> CENTURY: A SAMPLE SURVEY. **George A. Schnell\*** (SUNY New Paltz).

#### 11:00-11:15

27. THE EFFECT OF LARGE-SCALE GLOBAL ATMOSPHERIC-OCEAN INTERACTIONS ON LOCAL WEATHER CONDITIONS, A CASE STUDY: LANCASTER,

PENNSYLVANIA. **Carrie Miller\***, **Andrew Muller**, **Sepideh Yalda** and **Timothy Marcoe** (Millersville University).

#### 11:15-11:30

28. ESTIMATING THE CORIOLIS EFFECT IN THE TOILET BOWL. **Neil M. Shea\*** (Kutztown University).

#### 11:30-11:45

29. USING A FLIGHT SIMULATOR TO DETERMINE THE POWER CURVE FOR A SMALL AIRPLANE. **Daniel W. Tothoro\*** and **Neil M. Shea** (Kutztown University of Pennsylvania).

#### 11:45-12:00

30. STICK-SLIP FRICTION WITH SANDPAPER AND ITS RELATION TO EARTHQUAKES. **Michael J. Chester\*** and **Jason Foust** (Mansfield University).

### SATURDAY, APRIL 5

#### 1:15 - 5:00 PM

##### Session IV

**ENVIRONMENTAL SCIENCE, AQUATIC BIOLOGY AND BEHAVIORAL BIOLOGY**  
**Congressional Suite**

**Dr. Nancy Waters, Session Chair**

#### 1:15-1:30

31. DISTRIBUTION OF HEAVY METALS BY DEPTH IN A SECTION OF THE NEW JERSEY MEADOWLANDS, SECAUCUS, NEW JERSEY. **Elaine K. Brenner-Zalewski\*** (William Paterson University).

#### 1:30-1:45

32. MERCURY RESISTANT BACTERIA: A STUDY OF THE MOLECULAR MECHANISM FOR TOXICITY RESISTANCE AND MACROPHYTE ASSOCIATIONS. **Christine Williams\***, **Skye Harris** and **Nancy Waters** (Lafayette College).

#### 1:45-2:00

33. ASSESSMENT OF THE EFFECT OF ZINC ON PLANT GROWTH IN AQUATIC AND TERRESTRIAL HABITATS. **Karen Morey\***, **Paul Sherbloom** and **John A. Cigliano** (Cedar Crest College).

#### 2:00-2:15

34. DIGITAL FALSE-COLOR INFRARED IMAGING OF VEGETATION ON CULM BANKS. **William J. Tarutis, Jr.\*** (Lackawanna College).

#### 2:15-2:30

35. ENVIRONMENTAL EDUCATION THROUGH VIDEOLOGGING OF THE LOWER WEST BRANCH SUSQUEHANNA RIVER &#8211; IN COLLABORATION WITH THE LOWER WEST BRANCH SUSQUEHANNA RIVER CONSERVATION PLAN. **Carrie A. Monroe\***, **Renne Carey**, **Mel Zimmerman** and **Edward Gabriel** (Lycoming College).

#### 2:30-3:00 BREAK

#### 3:00-3:15

36. DOES COLONIZATION TIME INFLUENCE MACROINVERTEBRATE COMMUNITY MEASURES ON ARTIFICIAL SUBSTRATES? **Maureen Auro\***, **Tracey Hagen** and **Kimberly Lavalley** (Lafayette College).

#### 3:15-3:30

37. THE IMPACT OF ACID MINE DRAINAGE ON THE SEATON CREEK WATERSHED. **Shawn M. Rummel\***, **Sarah C. Grabowski\*** and **Fred J. Brenner** (Grove City College).

#### 3:30-3:45

38. RESPONSE OF FISH POPULATIONS TO NATURAL STREAM CHANNEL DESIGN RESTORATION ALONG BIG BEAR CREEK. **Mel Zimmerman\*** (Lycoming College).

#### 3:45-4:00

39. INITIAL ASSESSMENT OF SEMICONON RUN. **Scott Alexander<sup>1\*</sup>**, **Shaun L. Busler<sup>2</sup>**, **Heath Gamache<sup>3</sup>** and **Todd Garcia-Bish<sup>3</sup>** (<sup>1</sup>PA DEP, <sup>2</sup>Stream Restoration Inc., <sup>3</sup>Lutherlyn Environmental Education Program).

#### 4:00-4:15

40. ISLANDS IN THE STREAM: ISLAND BIOGEOGRAPHY AND DIATOMS IN PENNS CREEK, SNYDER COUNTY, PENNSYLVANIA. **Sarah Kiemle\*** and **Jack Holt** (Susquehanna University).

#### 4:15-4:30

41. DEVELOPMENT OF A RIVERINE COMMUNITY CLASSIFICATION MODEL FOR THE STATE OF PENNSYLVANIA. **Elizabeth Nightingale<sup>1</sup>**, **Ryan Evans<sup>2</sup>**, **Nels Johnson<sup>1</sup>**, **Charles Bier<sup>2</sup>**, **Tony Davis<sup>1</sup>** and **Susan Klugman<sup>1</sup>** (<sup>1</sup>PNDI-E/Pennsylvania Science Office of The Nature Conservancy, <sup>2</sup>PNDI-W/Western Pennsylvania Conservancy).

#### 4:30-4:45

42. MOTHER-OFFSPRING WEANING CONFLICT IN GUINEA PIGS. **Amy Clippinger\*** (Immaculata University).

#### 4:45-5:00

43. ENVIRONMENTAL ENRICHMENT FOR SUMATRAN TIGERS IN ZOOS VIA STIMULUS OBJECTS. **Jill VanMetter<sup>1\*</sup>**, **Rosina Bolen<sup>2</sup>** and **M. Dana Harriger<sup>1</sup>** (<sup>1</sup>Wilson College, <sup>2</sup>Mount St. Mary's College).

### SATURDAY, APRIL 5

#### 1:15 - 5:00 PM

##### Session V

**EDUCATION, CELL BIOLOGY, MOLECULAR BIOLOGY AND GENETICS**  
**Regency Suite**  
**Dr. Elaine Reynolds, Session Chair**

**1:15-1:30**

**44a.** RESPONSIBLE CONDUCT OF RESEARCH: PLAGIARISM. **Gaylen B. Bradley\*** (Pennsylvania State College of Medicine).

**1:30-1:45**

**44.** INDUCIBLE PROMOTER ACTIVITY IN VARIOUS CELL LINES. **Behzad Varmini\*** and **Jane F. Cavender** (Elizabethtown College).

**1:45-2:00**

**45.** ANALYSIS OF CHONDROITIN AC LYASE FROM FLAVOBACTERIUM COLUMNARE. **Melissa Shaya\*** and **Laurie Caslake** (Lafayette College).

**2:00-2:15**

**46.** ONSET OF CELLULAR SENESENCE AND THE RATE OF INFECTABILITY OF RAT EMBRYO FIBROBLASTS. **Michelle A. Wood\***, **Thomas O'Brien** and **Jane F. Cavender** (Elizabethtown College).

**2:15-2:30**

**47.** MICROARRAY ANALYSIS OF DIFFERENTIAL GENE EXPRESSION IN *ESCHERICHIA COLI* IN RESPONSE TO NITROGEN LIMITATION. **Ashley K. Palmer\*** and **Laurie F. Caslake** (Lafayette College).

**2:30-3:00 BREAK****3:00-3:15**

**48.** CHARACTERIZING THE EXPRESSION OF THE PAIRED-LIKE HOMEBOX GENE MANACLE IN *HYDRA VULGARIS*. **Tara H. Budinetz\*** and **Diane M. Bridge** (Elizabethtown College).

**3:15-3:30**

**49.** ORGANIC MERCURY RESISTANCE IS VARIABLE AND WIDESPREAD IN BACTERIAL ISOLATES FROM ONONDAGA LAKE. **Lee Williams\*** and **Laurie Caslake** (Lafayette College).

**3:30-3:45**

**50.** INVESTIGATING THE ROLE OF EMX FAMILY HOMEBOX GENES IN THE DEVELOPMENT OF THE CNIDARIAN *PODOCORYNA CARNEA*. **Danielle M. Underkoffler<sup>1</sup>\***, **Daniel E. Martinez<sup>2</sup>** and **Diane M. Bridge<sup>1</sup>** (<sup>1</sup>Elizabethtown College, <sup>2</sup>Pomona College).

**3:45-4:00**

**51.** ANALYSIS OF CLASS 1 INTEGRON IN MULTIPLE ANTIBIOTIC RESISTANT ENVIRONMENTAL ISOLATES. **Katie E. Schrack\*** and **Laurie F. Caslake** (Lafayette College).

**4:00-4:15**

**52.** USING REAGENTS AFFECTING THE PHOSPHOINOSITIDE CYCLE TO INVESTIGATE DEVELOPMENT OF THE CNIDARIAN *PODOCORYNA CARNEA*.

**Marcus K. Hoffman<sup>1</sup>\***, **Daniel E. Martinez<sup>2</sup>** and **Diane M. Bridge<sup>1</sup>** (<sup>1</sup>Elizabethtown College, <sup>2</sup>Pomona College).

**4:15-4:30**

**53.** AN EXPLORATION FOR THE NEURAL LOCUS OF BANG-SENSITIVITY IN THE *DROSOPHILA* BRAIN. **Kate Devlin\*** and **Elaine R. Reynolds** (Lafayette College).

**4:30-4:45**

**54.** PHENOTYPIC ANALYSIS OF *DROSOPHILA MELANOGASTER* NEURAL DEVELOPMENTN MUTANTS. **John Skinner\*** and **Lauren Yaich** (University of Pittsburgh at Bradford).

**4:45-5:00**

**55.** SIMIAN VIRUS 40 T-ANTIGEN NOT LOCALIZED IN THE NUCLEOLUS AS OBSERVED THROUGH IMMUNOFUORESCENCE. **Heidi Brashear\*** and **Jane F. Cavender** (Elizabethtown College).

**SATURDAY, APRIL 5****1:15 - 5:00****Session VI****MICROBIOLOGY, IMMUNOLOGY,  
MEDICINE AND SCIENCE AND RELIGION****Pennsylvania Suite****Dr. Brian Misanko, Session Chair****1:15-1:30**

**56.** THE EFFECTS OF SECONDARY LYMPHOID CHEMOKINE EXPOSURE ON T CELL RECEPTOR SIGNALING MOLECULES AND CYTOSKELETAL ELEMENTS. **Matt Rausch\*** and **Robert A. Kurt** (Lafayette College).

**1:30-1:45**

**57.** EXPRESSION OF *STAPHYLOCOCCUS AUREUS* PUR S IN *E. COLI*. **Erica Walsh\*** and **Jeffrey D. Newman** (Lycoming College).

**1:45-2:00**

**58.** IS RFLP ANALYSIS A PREDICTOR OF VIRAL HOST RANGE? **Amanda M. Sheard\*** and **Alan B. Hale** (Cedar Crest College).

**2:00-2:15**

**59.** INVESTIGATING THE ROLE OF TUMOR-DERIVED KC IN MURINE BREAST CANCER. **Rachel Harris\*** and **Robert A. Kurt** (Lafayette College).

**2:15-2:30**

**60.** EXPRESSION OF *STAPHYLOCOCCUS AUREUS* PUR Q IN *E. COLI*. **Jennifer Kinne\*** and **Jeffrey D. Newman** (Lycoming College).

**2:30-3:00 BREAK****3:00-3:15**

**61.** SELECTION AND ANALYSIS OF SV40 T ANTIGEN ESCAPE VARIANT MUTATIONS. **Alexandra Smith<sup>1</sup>\***, **Anuj Kalsy<sup>1</sup>**, **Gerald Hess<sup>1</sup>**, **Melanie Epler<sup>2</sup>**, **Todd Schell<sup>2</sup>**, **Satvir Tevethia<sup>2</sup>** and **Lawrence Mylin<sup>1</sup>** (<sup>1</sup>Messiah College, <sup>2</sup>The Pennsylvania State University College of Medicine).

**3:15-3:30**

**62.** DETECTION OF PLUM POX VIRUS (PPV) IN HERBACEOUS HOSTS. **Aletha Whitney<sup>1</sup>\***, **Ruth Welliver<sup>2</sup>** and **Deborah Austin<sup>1</sup>** (<sup>1</sup>Wilson College, <sup>2</sup>Pennsylvania Department of Agriculture).

**3:30-3:45**

**63.** ULTRASTRUCTURAL STUDIES OF CANINE ECTODERMAL DYSPLASIA AND EPIDERMOLYSIS BULLOSA. **Dawn L. Orwick\*** and **Richard G. Heller** (Albright College).

**3:45-4:00**

**64.** CORRELATION OF HEAD CT CHARACTERISTICS WITH INTRA-CRANIAL PRESSURE. **Jessica A. White<sup>1</sup>\***, **M.Todd Miller<sup>2</sup>** and **Brian S. Misanko<sup>1</sup>** (<sup>1</sup>Cedar Crest College, <sup>2</sup>Lehigh Valley Hospital and Health Network).

**4:00-4:15**

**65.** RELEASE OF GLUTATHIONE FROM AN ORAL DOSAGE FOR THE TREATMENT OF CYSTIC FIBROSIS LUNG DISEASE. **Jana Havranova<sup>1</sup>\***, **Frank T. Kuserk<sup>1</sup>**, **Terry Wignot<sup>2</sup>**, **Simantini Das<sup>3</sup>** and **Tibor Sipos<sup>3</sup>** (<sup>1</sup>Moravian College, <sup>2</sup>Wilkes University, <sup>3</sup>Digestive Care, Inc.).

**4:15-4:30**

**66.** NEUROGENESIS: UNLEASHING THE REGENERATIVE POTENTIAL OF THE ADULT BRAIN. **Willettta Wyatt Silva** (Villanova University).

**4:30-4:45**

**67.** EVOLUTIONARY LANDSCAPES IN TEILHARD DE CHARDIN. **Kathleen Duffy\*** (Chestnut Hill College).

**4:45-5:00**

**68.** THE EVOLUTION OF LOVE AND OTHER SOCIAL EMOTIONS. **Lewis M. Lutton** (Mercyhurst College).

**SUNDAY, APRIL 6****8:30 - 11:00 AM****Session VII****ZOOLOGY****Congressional Suite****Dr. Ruthanne Pitkin, Session Chair****8:30-8:45**

**69.** THE GRASSHOPPERS (ORTHOPTERA: ACRIDIDAE) OF PENNSYLVANIA. **Leo R. Donovall, III\***, **Joseph K. Sheldon** and **Christopher Heidenreich** (Messiah College).

**8:45-9:00**

**70.** MUSCULAR SPECIALIZATIONS FOR VENOM EXPULSION IN PITVIPERS. **Kristen Koenig<sup>1</sup>\***, **Kate Jackson<sup>2</sup>** and **Bruce A. Young<sup>1</sup>** (<sup>1</sup>Lafayette College, <sup>2</sup>Harvard University).

**9:00-9:15**

**71.** KINEMATIC MODULATION OF THE STRIKE OF THE EGYPTIAN COBRA (*NAJA HAJE*). **Michael Altmeier\***, **Amie Aguiar** and **Bruce A. Young** (Lafayette College).

**9:15-9:30**

**72.** FUNCTIONAL CONVERGENCE IN THE VENOM DELIVERY SYSTEM OF SNAKES. **Karen Dunlap\***, **Meredith Singer**, **Kristen Koenig** and **Bruce A. Young** (Lafayette College).

**9:30-9:45**

**73.** VERTICAL POSTURING AND PENDULAR MECHANICS IN COBRAS. **Oliver Round\*** and **Bruce A. Young** (Lafayette College).

**9:45-10:00**

**74.** HOW SPITTING COBRAS SPIT. **Meredith Singer\***, **Karen Dunlap**, **Kristen Koenig** and **Bruce A. Young** (Lafayette College).

**10:00-10:30 BREAK****10:30-10:45**

**75.** MULTIPLE PATHWAYS AND CONTEXTUALIZATION OF HEARING IN RATTLESNAKES. **Erica Neri\*** and **Bruce A. Young** (Lafayette College).

**10:45-11:00**

**76.** SEABIRDS, SNAKES, AND THINGS THAT GO THUMP IN THE NIGHT. **Amie Aguiar\*** and **Bruce A. Young** (Lafayette College).

**SUNDAY, APRIL 6****8:30 - 11:00 AM****Session VIII****BOTANY, ENTOMOLOGY  
AND PARASITOLOGY****Regency Suite****Dr. Bruce Smith, Session Chair****8:30-8:45**

**77.** MACROALGAE OF SOUTHERN CHINCOTEAGUE BAY SHALLOW WATER ECOSYSTEMS.

**Jerilyn Jewett-Smith\***, Elaine Moyer and Kerri Koch (East Stroudsburg University).

#### 8:45-9:00

**78.** A STUDY OF EARLY OVULE DEVELOPMENT OF *IMPATIENS PALLIDA* NUTT. USING THE HERR CLEARING TECHNIQUE. **Bruce Smith\*** and Christina Gouirand (York College of Pennsylvania).

#### 9:00-9:15

**79.** SELF-INCOMPATIBILITY SYSTEMS AND POLLINATORS OF SIX UNDERSTORY *PSYCHOTRIA* SPECIES ON BARRO COLORADO ISLAND, PANAMA. **Amy E. Faivre\*** (Cedar Crest College).

#### 9:15-9:30

**80.** REPRODUCTIVE CAPACITY IN *ALLIARIA PETIOLATA* (GARLIC MUSTARD). **Jan Mikesell\*** (Gettysburg College).

#### 9:30-9:45

**81.** GENETIC DIVERSITY AND THE CURRENT STATUS OF *RUELLIA* (ACANTHACEAE) IN PENNSYLVANIA: TWO ENDANGERED/THREATENED SPECIES. **Erin A. Tripp\***, Ann F. Rhoads, Lucinda A. McDade and Timothy A. Block (Morris Arboretum of the University of Pennsylvania).

#### 9:45-10:00

**82.** THE BIOLOGY AND CONTROL OF THE JAPANESE MEALYBUG AT THE MORRIS ARBORETUM. **Tara Taws Claghorn\*** (Morris Arboretum of the University of Pennsylvania).

#### 10:00-10:30 BREAK

#### 10:30-10:45

**83.** SURVEILLANCE FOR VIRAL ANTIBODIES IN EASTERN COYOTES (*CANIS LATRANS*). **Sheryl Koziar\***, Amy Bussom and Richard L. Stewart Jr. (Shippensburg University).

#### 10:45-11:00

**84.** EXPERIMENTAL INFECTION OF *HELISOMA TRIVOLVIS* (COLORADO STRAIN) SNAILS WITH CERCAIRAE OF *ECHINOSTOMA CAPRONI*. **Elizabeth L. Ponder\*** and Bernard Fried (Lafayette College).

### SUNDAY, APRIL 6

#### 8:20 - 11:00 AM

##### Session IX

#### INVASIVE SPECIES SYMPOSIUM Pennsylvania Suite

**Dr. John Campbell, Symposium Chair**

#### 8:20-8:35

INTRODUCTION. **Speaker to be announced.**

#### 8:35-8:50

**85.** PRELIMINARY CONTROL PLANNING FOR INVASIVE PLANT SPECIES AT LAKE PLEASANT PONDS. **Todd Sampsell<sup>1</sup>\*** and Nevin T. Welte<sup>2</sup> (<sup>1</sup>Western Pennsylvania Conservancy, <sup>2</sup>Mercyhurst College).

#### 8:50-9:05

**86.** THE EFFECT OF POND HYDROPERIOD ON THE DISTRIBUTION OF NATIVE SALAMANDERS AND INTRODUCED PREDATORS IN ARID LANDS. **Timothy J. Maret<sup>1</sup>\*** and Jonathan Snyder<sup>2</sup> (<sup>1</sup>Shippensburg University, <sup>2</sup>US Fish and Wildlife Service, CA).

#### 9:05-9:20

**87.** IMPACT OF INVASIVE SPECIES ON THE BIODIVERSITY OF PRESQUE ISLE, ERIE COUNTY, PENNSYLVANIA. **J. Michael Campbell<sup>1</sup>\*** and Eric Obert<sup>2</sup> (<sup>1</sup>Mercyhurst College, <sup>2</sup>Penn State Erie).

#### 9:20-9:35

**88.** THE EFFECTS OF PHRAGMITES CONTROL EFFORTS ON UNIONID AND BENTHIC MACROINVERTEBRATE POPULATIONS OF A NEARSHORE AREA OF THOMPSON BAY, PRESQUE ISLE, ERIE, PA. **Nevin T. Welte\*** and Erik A. Weber (Mercyhurst College).

#### 9:35-10:05 BREAK

#### 10:05-10:20

**88a.** INVASIVE PLANT SPECIES ENCOUNTERS WHILE DOING COUNTY NATURAL HERITAGE INVENTORIES IN WESTERN PENNSYLVANIA. **Robert Coxe\*** (Western Pennsylvania Conservancy).

#### 10:20-10:35

**88b.** PHRAGMITES AUSTRALIS: IS IT AS BAD AS ECOLOGISTS BELIEVE? **Elain K. Brenner-Zalewski\*** (William Paterson University).

#### 10:35-11:00

CLOSING REMARKS. **Speaker to be announced.**

### POSTER SESSION I SATURDAY, APRIL 5

#### 9:00 - 11:30 AM

#### CELL BIOLOGY, MOLECULAR BIOLOGY, GENETICS AND FORENSICS

##### Royale 1, 2, 3

**Dr. Lauren Yaich, Session Chair**

Presenters should be in attendance at their posters from 9:30 until 11:00 AM

**89.** INDUCING APOPTOSIS OF *GLIOBLASTOMA MULTIFORME* CELLS USING A BCL-2 SPECIFIC SIRNA SEQUENCE. **Valerie P. Capozziello\*** (York College of Pennsylvania).

**90.** EFFECT OF pH ON THE ANESTHETIC ACTION OF ALKYL ALCOHOLS. **Brianna Lindsay\***, Michael Klingler\* and James Sidie (Ursinus College).

**91.** ACCESSORY PROTEINS AND THEIR INVOLVEMENT IN LIPOPROTEIN SYNTHESIS. **Sariah Allen\***, Daneen Grossman\* and K. Joy Karnas (Cedar Crest College).

**92.** ISOLATION OF THE TRKB GENE FROM A SIMPLE INVERTEBRATE. **Amie L. Shaffer\*** and Diane M. Bridge (Elizabethtown College).

**93.** WNT SIGNALING DURING SEA URCHIN EMBRYONIC CELL SPECIFICATION. **Anna M. Dechtiaruk\***, Becki M. Bert\* and Margaret T. Peeler (Susquehanna University).

**94.** GREY HORSES AS A POTENTIAL MODEL FOR METASTATIC MELANOMA. **Jill Stoneroad\*** and Jane F. Cavender (Elizabethtown College).

**95.** THE EFFECTS OF ANGIOTENSIN II AND BRADYKININ STIMULATION ON CYTOSKELETAL REARRANGEMENT IN NEONATAL RAT CARDIAC CELLS. **Nicholas D. Barker**, Christopher M. Meharg and Thomas C. Peeler (Susquehanna University).

**96.** ALBUMIN INTERFERES WITH THE ANESTHETIC EFFECT OF ALKYL ALCOHOLS IN A DOSE DEPENDENT RELATIONSHIP. **Matthew Mount\*** and James Sidie (Ursinus College).

**97.** THE ROLE OF  $\beta 8$  INTEGRIN IN THE INTERACTION BETWEEN SCHWANN CELLS AND EXTRACELLULAR MATRIX. **Marhja L. O. Lanns**, Heather A. Messner, Timothy S. Pelc and Thomas C. Peeler (Susquehanna University).

**98.** CHARACTERIZATION OF MEPRIN METALLOPROTEINASE IN HUMAN KIDNEY AND GLIOBLASTOMA CELL LINES. **Ryan Gailey<sup>1</sup>\***, Lucinda H. Elliott<sup>1</sup> and Judith Bond<sup>2</sup> (<sup>1</sup>Shippensburg University, <sup>2</sup>Hershey College of Medicine).

**99.** EFFECT OF CREATINE TREATMENT ON INSULIN RECEPTOR ACTIVITY. **Gerard Barscheski\*** and Ronald C. Kaltreider (York College of Pennsylvania).

**100.** EFFECT OF ADVANCED GLYCATION END-PRODUCTS (AGES) ON HYPOXIA INDUCIBLE FACTOR (HIF)-1A ACTIVATION AND PARTNERING. **Susan Curilla\*** and Ronald C. Kaltreider (York College of Pennsylvania).

**101.** MEASURING RESPIRATION IN ARABIDOPSIS FATTY ACID MUTANTS. **Del Lucent\***, Yueh-Ju Hsiao and William Terzaghi (Wilkes University).

**102.** SEQUENCE ANALYSES OF TEMPERATE AND VIRULENT BACTERIOPHAGES INFECTING A COMMON HOST SPECIES. **Kimberly N. Bieniek\***, Leanne M. Follweiler\*, Megan W. Miller\* and Alan B. Hale (Cedar Crest College).

**103.** PROKARYOTIC PRODUCTION OF HUMAN INTERLEUKIN 13 RECEPTOR ALPHA 2, ACANCER-ASSOCIATED ANTIGEN. **Erin L. McAnallen\*** (York College of Pennsylvania).

**104.** CHARACTERIZATION AND VISUALIZATION OF THE INVOLVEMENT OF THE SECRETORY PATHWAY IN LIPOPROTEIN BIOSYNTHESIS. **Dawn Karzenowski\***, Christina Antolino\* and K. Joy Karnas (Cedar Crest College).

**105.** ALBUMIN INHIBITS THE ANESTHETIC EFFECT OF ALKYL ALCOHOLS. **Nick Weber\*** and James Sidie (Ursinus College).

**106.** PREPARATION AND STAINING OF HUMAN DIPLOID FIBROBLAST METAPHASE SPREADS FOR OBSERVATION OF THE NUCLEOLAR ORGANIZING REGIONS. **Heidi Brashear**, Ashley Petrylak\* and Jane F. Cavender (Elizabethtown College).

**107.** INVESTIGATION OF SPECIFIC GENES WITHIN A NEWLY SEQUENCED BACTERIOPHAGE. **Johanna M. Schwingel\*** and Alan B. Hale (Cedar Crest College).

**108.** AMINOPEPTIDASE N ACTIVITY IS REDUCED IN *DROSOPHILA* SLAMDANCE MUTANTS. **Eric P. Ingersoll<sup>1</sup>\***, Ashley J. Martin<sup>1</sup>, Lance Lacoff<sup>2</sup> and Elaine R. Reynolds<sup>2</sup> (<sup>1</sup>Penn State Abington, <sup>2</sup>Lafayette College).

**109.** RFLP ANALYSIS OF merA IN MERCURY RESISTANT ORGANISMS YIELDS NEW VARIANTS. **M.C. Guinan\*** and Laurie Caslake (Lafayette College).

**110.** ENGINEERING OF AN EXPRESSION VECTOR CONTAINING A CLONED CDNA ENCODING HUMAN LIVER CALPASTATIN. **Nicholas Hess<sup>1</sup>\***, Nicole Gantt<sup>2</sup> and Lucinda H. Elliott<sup>1</sup> (<sup>1</sup>Shippensburg University, <sup>2</sup>Shepherd College).

**111.** CLONING AND EXPRESSION OF A NOVEL GFP:BOTOX FUSION PROTEIN FROM A PROKARYOTIC EXPRESSION SYSTEM. **Jessica M. Boehmler\*** (York College of Pennsylvania).

**112.** A POSSIBLE ROLE FOR SEMAPHORIN GUIDANCE CUES IN SEA URCHIN PRIMARY MESENCHYME CELL MIGRATION. **Windy S. Williams\***, Marie E. Maradeo\* and Margaret T. Peeler (Susquehanna University).

**113.** DETERMINING PHOTOSYNTHETIC CHARACTERISTICS OF RED AND WHITE OAK SEEDLINGS. **Michael Brown\***, Yueh-Ju Hsiao, Kamran Kalim, Del Lucent, Eric Luther, Amy McEuen, Peter Smallwood, Michael Steele and William Terzaghi (Wilkes University).

**114.** *DROSOPHILA* NEURAL DEVELOPMENT MUTANTS HOMOTHORAX AND L(3)06442: A PHENOTYPIC ANALYSIS. **DesaRae Krepps\*** and Lauren Yaich (University of Pittsburgh at Bradford).

**115.** AN IMPROVED PAC SHUTTLE VECTOR SYS-

TEM FOR BIDIRECTIONAL DELETION ANALYSIS. **A. Prasad\***, **K. Howell** and **J. Coren** (Elizabethtown College).

**116.** ANALYSIS OF DNA SEQUENCE VARIATION IN THE *DROSOPHILA SIMULANS* SPECIES COMPLEX. **Elizabeth Smith\***, **Rose Moran\***, **Jennifer Stephens\*** and **Richard Kliman** (Cedar Crest College)

**117.** DETERMINING RELATIONSHIPS BETWEEN OAK SEEDLINGS AND ADULT TREES IN NATIVE FORESTS BY DNA FINGERPRINTING. **Tiffany Lep-tuck<sup>1</sup>\***, **Valerie Breznak<sup>1</sup>**, **John Carlson<sup>2</sup>**, **Fritz Delva<sup>1</sup>**, **Eric Eutsler<sup>1</sup>**, **Douglas Frederick<sup>1</sup>**, **Jason Hoch<sup>1</sup>**, **Eric Luther<sup>1</sup>**, **Holly Marking<sup>2</sup>**, **Amy McEuen<sup>1</sup>**, **Richard Meisel<sup>2</sup>**, **Deana Mikhalkova<sup>1</sup>**, **Peter Smallwood<sup>3</sup>**, **Michael Steele<sup>1</sup>**, **Debra Stillman<sup>1</sup>**, **Nadia Terzaghi<sup>1</sup>** and **William Terzaghi<sup>1</sup>** (<sup>1</sup>Wilkes University, <sup>2</sup>Pennsylvania State University, <sup>3</sup>University of Richmond).

**118.** MEASURING POLLEN FLOW IN NATIVE OAK FORESTS BY DNA FINGERPRINTING. **Debra Stillman<sup>1</sup>\***, **John Carlson<sup>2</sup>**, **Teresa Genna<sup>1</sup>**, **James Hunsinger<sup>1</sup>**, **Holly Marking<sup>2</sup>**, **Amy McEuen<sup>1</sup>**, **Richard Meisel<sup>2</sup>**, **Peter Smallwood<sup>3</sup>**, **Emily Sheston<sup>1</sup>**, **Michael Steele<sup>1</sup>** and **William Terzaghi<sup>1</sup>** (<sup>1</sup>Wilkes University, <sup>2</sup>Pennsylvania State University, <sup>3</sup>University of Richmond).

**119.** QUALITATIVE SPOT TEST FOR THE DETECTION OF EDTA IN BLOODSTAINS. **Carol M. Stein<sup>1</sup>\***, **Lawrence Quarino<sup>1</sup>** and **Barbara Rowley<sup>2</sup>** (<sup>1</sup>Cedar Crest College, <sup>2</sup>Pennsylvania State Police Crime Laboratory)

## POSTER SESSION II SATURDAY, APRIL 5

**1:30 PM - 4:00 PM**  
**AQUATIC BIOLOGY, BOTANY,  
BIOCHEMISTRY, MICROBIOLOGY,  
IMMUNOLOGY, MEDICINE, PHYSIOLOGY,  
PSYCHOBIOLOGY, ENGINEERING  
AND EDUCATION**  
**Royale 1, 2, 3**  
**Dr. Wendy Ryan, Session Chair**

Presenters should be in attendance at their posters  
from 2:00 until 3:30 PM

**120.** ASSESSMENT OF BENTHIC MACROINVERTEBRATE COMMUNITIES IN THE PRESQUE ISLE BAY WATERSHED. **John M. Campbell\***, **Greg Dore**, **Nevin Welte**, **SusAnne Sisak** and **Dave Adams** (Mercyhurst College).

**121.** ENVIRONMENTAL ASSESSMENTS OF MUNCY CREEK WATERSHED - MONITORING OF WATER CHEMISTRY, MACROINVERTEBRATES AND FISH BEFORE, DURING AND AFTER STREAM RESTORATION. **Christina Appleman\***, **Carrie A. Monroe** and **Mel Zimmerman** (Lycoming College).

**122.** GAS BUBBLE DISEASE IN DEVELOPING JAPANESE MEDAKA (*ORYZIAS LATIPES*). **Mandy Weatherill\*** and **Wendy L. Ryan** (Kutztown University of Pennsylvania).

**123.** ANALYSIS OF PLANKTON COMMUNITIES IN QUARRY PONDS OF NORTHWEST PENNSYLVANIA. **Kathryn E Krupa\*** (Mercyhurst College).

**124.** FUNGAL BIOMASS AND ROLL IN LEAF PROCESSING IN TWO NORTH CENTRAL PA STREAMS. **Anthony Sowers\***, **Jennifer Clark**, **Mel Zimmerman** and **Michelle Briggs** (Lycoming College).

**125.** THE EFFECT OF A TREMATODE PARASITE ON THE BEHAVIOR OF A NEW ZEALAND SNAIL IN LAKE PEORUA, NEW ZEALAND. **Shane Lunnen\***, **Carolyn Itle\*** and **Edward P. Levri** (Penn State Altoona).

**126.** HARVESTING PROPHAGE FROM GEOGRAPHICALLY-DISTINCT POPULATIONS OF BACTERIA. **Andrea R. Beyer\*** and **Alan B. Hale** (Cedar Crest College).

**127.** REFUGES INDICATE THE EFFECTS OF OVERBROWSING ON HERBACEOUS PLANT COMMUNITIES IN A NORTHERN HARDWOOD FOREST. **George El Bayadi\*** and **Daniel S. Townsend** (University of Scranton).

**128.** EVALUATION AND PERFORMANCE OF SELECTED TENDER PERENNIALS GROWN IN A 2002 PLANT TRIAL. **Jessica M. Luckenbaugh\*** and **Marilyn Daly** (York College of Pennsylvania).

**129.** AN INVESTIGATION OF GENOME SIZE IN *MIMULUS GUTTATUS* AND *MIMULUS NASUTUS* (SCROPHULARIACEAE). **Matthew DiLeo\***, **Kyle Shoenberger**, **Nicholas Peacock**, **Rohit Rajoria**, **Robert Dawley** and **Mary Fields** (Ursinus College).

**130.** RECOVERY OF AN HERBACEOUS PLANT COMMUNITY EIGHT YEARS AFTER EXCLUSION OF WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*). **Meghan J. Blair\***, **Courtney M. Grundmayer**, **Rosemary T. Gownley** and **Daniel S. Townsend** (University of Scranton).

**131.** THE RESPONSE OF SEEDLINGS TO EIGHT YEARS OF PROTECTION FROM BROWSING BY WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) IN A NORTHERN HARDWOOD FOREST. **Rosemary T. Gownley\***, **Courtney M. Grundmayer**, **Meghan J. Blair** and **Daniel S. Townsend** (University of Scranton).

**132.** COMPARATIVE MORPHOLOGY OF *PLUMBAGO AURICULATA* AND *PLUMBAGO INDICA* SEALS. **R.D. Kettering\***, **S. E. Williams**, and **A. F. Wolfe** (Lebanon Valley College).

**133.** COMPARISON OF SELECTED SOUTH AFRICAN DAISIES WITH CULTIVATED VARIETIES OF COM-

MONLY GROWN ANNUAL DAISIES. **James Mulligan\*** and **Marilyn Daly** (York College of Pennsylvania).

**134.** IDENTIFICATION OF THE SPECIFIC CYTOCHROME P450(S) INHIBITED BY PHENETHYL ISOTHIOCYANTE THRU AFFINITY CHROMATOGRAPHY. **Lori-Lynn Predmore\***, **Devon Ingram\*** and **Marianne Staretz** (Cedar Crest College).

**135.** PURIFICATION AND CHARACTERIZATION OF CIS AND TRANS PHOTOISOMERS OF INTERMEDIATES OF THE PHENYLPROPANOID PATHWAY IN HIGHER PLANTS. **Paul Kretzer**, **Jessica Ellerman\*** and **Thomas Brennan** (Dickinson College).

**136.** INTERACTION OF SELENIUM COMPOUNDS WITH MICROTUBULE PROTEIN. **Elisia D. Tichy\*** and **Marianne E. Staretz** (Cedar Crest College).

**137.** BACTERIAL ACQUISITION OF RESISTANCE TO ANTIBIOTICS. **Jessica Wolgemuth\***, **Kelly Smith\*** and **Marcie L. Baer** (Shippensburg University).

**138.** FACTORS AFFECTING *E. COLI* GROWTH IN LIMED VERSUS ANAEROBICALLY DIGESTED SLUDGE. **Justin A. Hayes\*** and **Dr. Carol Bair** (York College of Pennsylvania).

**139.** ISOLATION AND IDENTIFICATION OF CHITINOLYTIC BACTERIA FROM THE NORTHERN PITCHER PLANT, *SARRACENIA PURPUREA*. **Alyson Dobracik\*** and **Frank T. Kuserk** (Moravian College).

**140.** ISOLATION OF UNCULTURABLE MICROORGANISMS FROM MARINE SEDIMENT. **Sarah Fischman\***, **Jeffrey Obrzut** and **Thomas McGuire** (Penn State Abington).

**141.** ESTROGEN AND ESTROGENIC ENDOCRINE-DISRUPTING CHEMICALS AFFECT PROTEIN EXPRESSION IN IMMUNE CELLS. **Hestia Mellert\***, **Derease Getnet**, **Ella Lazo**, **Brett Scipioni**, **Michelle Hornbaker** and **Rebecca A. Roberts** (Ursinus College).

**142.** EVALUATION OF THE USE OF KETAMINE GEL APPLIED TOPICALLY AWAY FROM THE SITE OF PAIN IN PATIENTS WITH NEUROPATHIC PAIN. **Catherine Burns<sup>1</sup>\***, **Maryjane Cerrone<sup>2</sup>** and **Brian S. Misanko<sup>1</sup>** (<sup>1</sup>Cedar Crest College, <sup>2</sup>Lehigh Valley Hospital).

**143.** CLASSIFICATION OF BRAIN TUMORS USING MAGNETIC RESONANCE SPECTROSCOPY. **Martine T. Silver** and **Brian S. Misanko** (Cedar Crest College).

**144.** THE EFFECTS OF ESTROGEN ON GLUCOSE COTRANSPORT WITHIN THE SMALL INTESTINE OF OVARECTOMIZED FEMALE RATS. **Christopher M. House\***, **Sarah M. Klinge** and **Richard Schauer** (Gannon University).

**145.** ANTICONVULSANT PROPERTIES OF *PIPER METHYSTICUM* APPLIED TO *HIRUDO MEDICINALIS* RETZIUS NEURONS. **Rachel L. Griest\***, **Deanna K. Hutchinson\*** and **Kent K. Fitzgerald** (Cedar Crest College).

**146.** DETERMINATION OF THE EFFECTS OF *PIPER METHYSTICUM*, A BOTANICAL ANTICONVULSANT, ON CALCIUM LEVELS IN RETZIUS NEURONS OF *HIRUDO MEDICINALIS*. **Joanne E. Gablik\***, **Elizabeth A. Schofield\*** and **Kent K. Fitzgerald** (Cedar Crest College).

**147.** THE EFFECT OF TASK COMPLEXITY ON GENDER DIFFERENCES IN SPATIAL LEARNING IN RATS. **Mary E. Olanich\***, **Laura E. Fuhrman\***, **Deanna L. Dodson** and **Dale J. Erskine** (Lebanon Valley College).

**148.** NANOFABRICATION TECHNOLOGY IN ENGINEERING TECHNOLOGY EDUCATION. **Wieslaw Grebski\*** (Penn State Hazleton).

**149.** ADVANCED PLACEMENT (AP) BIOLOGY PROGRAM: A BETTER PROGRAM FOR THE COLLEGE-BOUND STUDENT. **Angelique Chronister\*** and **Ronald C. Kaltreider** (York College of Pennsylvania).

**150.** WHY DO MENDEL'S PEAS WRINKLE?: A LAB THAT LINKS GENOTYPE AND PHENOTYPE. **Ruthanne B. Pitkin\*** (Shippensburg University).

## POSTER SESSION III SUNDAY, APRIL 6

**8:30 - 11:00 AM**  
**ECOLOGY, ZOOLOGY, PHYCOLOGY,  
ENVIRONMENTAL SCIENCE,  
TOXICOLOGY AND GEOLOGY**  
**Royale 1, 2, 3**  
**Dr. Todd Hurd, Session Chair**

Presenters should be in attendance at their posters  
from 9:30 until 11:00 AM

**151.** CHEMICAL DIFFERENCES BETWEEN PREFERRED AND UNPREFERRED GOLDENROD (*SOLIDAGO ALTISSIMA*) CLONES AND THE LINK TO GALL FLY (*EUROSTA SOLIDAGINIS*) GALLING BEHAVIOR. **Crystal McKinney\***, **Kimberly Hengst**, **Holly D. Bendorf** and **Michelle A. Briggs** (Lycoming College).

**152.** DEER BROWSING AND RECRUITMENT FAILURE AS FACTORS IN THE CONTINUING DECLINE OF PA POPULATIONS OF A RARE WILDFLOWER, *EUPHORBIA PURPUREA*. **Michael Salvatore\***, **Katherine Siddoway\*** and **Carol Loeffler** (Dickinson College).

**153.** INVESTIGATION OF COMPETITIVE AND PREDATORY INTERACTIONS BETWEEN SALAMANDERS AND CRAYFISH IN FRESHWATER STREAMS. **Matthew S. Campbell\***, **Kyle J. Lorditch\***, **Claudia E. Rocca**, **Timothy J. Scripko Jr.** and **Timothy J. Maret** (Shippensburg University).

**154.** INVESTIGATIONS ON THE LIFE HISTORY OF TWO INVASIVE SPECIES: *ALLIARIA PETIOLATA* (M. BEIB.) CAVARA & GRANDE AND *HESPERIS MATRONALIS*. **L. Jennifer Robison\*** and **Carol Loeffler** (Dickinson College).

**155.** EVALUATION OF SOIL MICROBIAL COMMUNITIES BETWEEN BLACK LOCUST (*ROBINIA PSEUDOACACIA*) AND TULIP POPLAR (*LIRIODENDRON TULIPIFERA*) IN A PENNSYLVANIA FOREST. **Sherry A. Cramer\*** and **Karl W. Kleiner** (York College of Pennsylvania).

**156.** THE RELATIONSHIP BETWEEN LARVAL POPULATIONS OF THE SACRAMENTO MOUNTAINS CHECKERSPOT BUTTERFLY, *EUPHYDRYAS ANICIA* CLOUDCROFTI AND ITS HOST PLANT, *PENSTEMON NEOMEXICANA*. **Rachael Ryan\*** and **Frank T. Kuserk** (Moravian College).

**157.** RELATIVE CONTRIBUTIONS OF FISH HATCHERY CARBON TO SPRING CREEK SEDIMENTS AND POLLUTION TOLERANT ISOPODS. **Slaven Jesic\*** and **Todd M. Hurd** (Shippensburg University).

**158.** A BASELINE ENTOMOLOGICAL SURVEY OF THE MEADOW AT THE ACOPIAN CENTER FOR CONSERVATION LEARNING AT HAWK MOUNTAIN SANCTUARY. **Jeanine M. Schantz\*** and **John A. Cigliano** (Cedar Crest College).

**159.** LIGHT TRANSMISSION THROUGH A FOREST CANOPY. **Elyse A. Casper\***, **Christopher J. Graham\***, **Kenneth L. Laws** and **Brian S. Pedersen** (Dickinson College).

**160.** THE EFFECTS OF OAK MAST ON ACORN DISPERSAL AND ESTABLISHMENT: A TEST OF THE PREDATOR SATIATION HYPOTHESIS. **Seth Reed<sup>1\*</sup>**, **Michael Sherick<sup>1</sup>**, **Amy McEuen<sup>1</sup>**, **Michael Steele<sup>1</sup>**, **Tom Contreras<sup>1</sup>** and **Peter Smallwood<sup>2</sup>** (<sup>1</sup>Wilkes University, <sup>2</sup>University of Richmond).

**161.** THE ADAPTIVE SIGNIFICANCE OF CHEMICAL GRADIENTS IN ACORNS. **Michael Steele<sup>1\*</sup>**, **Edmund Stiles<sup>2</sup>**, **Amy McEuen<sup>1</sup>**, **Peter Smallwood<sup>3</sup>** and **William Terzaghi<sup>1</sup>** (<sup>1</sup>Wilkes University, <sup>2</sup>Rutgers University, <sup>3</sup>University of Richmond).

**162.** HABITAT SELECTION BY SPOTTED TURTLES (*CLEMMYS GUTTATA*) IN A HEAVILY MANAGED AREA OF MICHAUX STATE FOREST, PENNSYLVANIA. **Tracey M. Librandi\*** and **Timothy J. Maret** (Shippensburg University).

**163.** DEN AFFINITY AND MOVEMENT PATTERNS OF THE ALLEGHENY WOODRAT (*NEOTOMA MAGISTER*) IN SOUTHWESTERN PENNSYLVANIA. **Michael R. Faix<sup>1</sup>**, **John D. Peles<sup>1\*</sup>** and **Janet Wright<sup>2</sup>** (<sup>1</sup>Pennsylvania State University, <sup>2</sup>Dickinson College).

**164.** PATTERNS OF WOODY REGENERATION AND *MICROSTEGIUM* INVASION IN A TEN-YEAR DEER EXCLOSURE EXPERIMENT IN SOUTH-CENTRAL PENNSYLVANIA. **Melissa Merdinger\***, **Natalie Moulton\*** and **Carol Loeffler** (Dickinson College).

**165.** THE INFLUENCE OF DEER HERBIVORY ON ESTABLISHMENT AND REPRODUCTIVE SUCCESS OF MOUNTAIN LAUREL (*KALMIA LATIFOLIA*). **Diane**

**M. Rhone, Maureen A. Levri** and **Edward P. Levri** (Penn State Altoona).

**166.** HABITAT USE OF BLACK-THROATED GREEN WARBLERS. **Steven R. Hawk\*** and **Terry L. Master** (East Stroudsburg University).

**167.** MICROSCOPIC STUDY OF THE CUTICULAR SETAE ON THE BODY OF *ARTEMIA FRANCISCANA*. **N. M. Petrovich\*** and **A. F. Wolfe** (Lebanon Valley College).

**168.** THE EFFECT OF PREDATION RISK ON MALE COURTSHIP AND COPULATORY BEHAVIOR IN THE WOLF SPIDER *PARDOSA MILVINA*. **Abraham Taylor\*** and **Matthew Persons** (Susquehanna University).

**169.** A COMPARISON OF THE EFFECT OF PULSED AND CONTINUOUS PREDATION RISK ON BODY CONDITION AND EGG PRODUCTION IN THE WOLF SPIDER *PARDOSA MILVINA*. **Valerie A. Wolfgang\*** and **Katherine A. Hess\*** (Susquehanna University).

**170.** SPATIAL AND SEASONAL DEN USE IN ALLEGHENY WOODRATS (*NEOTOMA MAGISTER*) IN SOUTH-CENTRAL PENNSYLVANIA. **Christopher, S. Kiefer<sup>1\*</sup>**, **Christopher Magel<sup>1\*</sup>**, **John D. Peles<sup>2</sup>**, **Laura A. Pell<sup>1\*</sup>** and **Janet Wright<sup>1</sup>** (<sup>1</sup>Dickinson College, <sup>2</sup>Pennsylvania State University McKeesport).

**171.** IDENTIFICATION AND QUANTIFICATION OF MACROEPIPHYTES OF THE INVASIVE MARINE ALGA, *CODIUM FRAGILE* SUBS. TOMENTOSOIDES. **K. Koch\***, **E. Moyer** and **J. Jewett-Smith** (East Stroudsburg University).

**172.** IDENTIFICATION AND QUANTIFICATION OF THE MACROALGAL EPIPHYTES OF THE SEAGRASS *ZOSTERA MARINA*. **E. Moyer\***, **K. Koch** and **J. Jewett-Smith** (East Stroudsburg University).

**173.** LYCOMING CREEK EROSION EVALUATION. **Theresa M. Black\***, **Amy Curry** and **Mel Zimmerman** (Lycoming College).

**174.** TRIBUTARY WATER QUALITY IN DROUGHT AND DROUGHT ALLEVIATION. **Regina Lamendella<sup>1\*</sup>**, **Meghan Rothenberger<sup>2</sup>** and **Lorraine Mineo<sup>1</sup>** (<sup>1</sup>Lafayette College, <sup>2</sup>North Carolina State University).

**175.** IMPACT OF ABANDONED MINE DRAINAGE ON RIPARIAN PLANT COMMUNITIES ALONG STREAMS IN THE WYOMING VALLEY OF NORTHEASTERN PENNSYLVANIA. **Stacy A. Rizzo\***, **Chuck Angelo**, **Jesse Hassan**, **Jim Mack**, **Erica Robaczewski**, **Kenneth Klemow** and **William Toothill** (Wilkes University).

**176.** THE USE OF LICHENS AS AIR QUALITY INDICATORS IN NORTH WESTERN PA. **Dawn Messina\*** (Mercyhurst College).

**177.** NON-POINT SOURCE NUTRIENT MANAGEMENT IN A SMALL LAKE. **Jessica J. Hopper\*** and **Thomas E. Murray** (Elizabethtown College).

**178.** THE EFFECT OF BT CORN POILEN ON ADULT GREEN LACEWING (*CHRYSOPELTA CARNEA*) FECUNDITY AND SURVIVABILITY. **Joseph K. Sheldon<sup>1</sup>**, **Rachel Gallusser<sup>1\*</sup>**, **Gretchen Radke<sup>1\*</sup>** and **Charles Mason<sup>2</sup>** (<sup>1</sup>Messiah College, <sup>2</sup>University of Delaware).

**179.** THE ASSESSMENT OF TIMED PRE-NATAL LEAD EXPOSURE ON NEURAL DEVELOPMENT BASED ON TASK PERFORMANCE IN CD1 MICE. **Rebecca L. Roller\*** and **Bradley G. Rehnberg** (York College of Pennsylvania).

**180.** DOES CIRCUMSTANTIAL EVIDENCE AND FIELD DATA DETERMINE THE BOLIVIAN ITURRALDE FEATURE AS A SOFT SEDIMENT IMPACT CRATER? **Sara E. Brown\*** and **Sandra Holmes** (Messiah College).

**181.** MEASUREMENT OF TRICLOSAN AND BUTYLATED HYDROXYTOLUENE IN THE CARLISLE, PA REGIONAL WATER POLLUTION CONTROL FACILITY. **Julie D. Vastine\***, **Amy E. Witter**, and **Candie C. Wilderman** (Dickinson College).

## Abstracts of Papers<sup>†</sup>

### 79th Annual Meeting of the Pennsylvania Academy of Science

April 4–6, 2003  
Holiday Inn  
Grantville, PA

(Arranged in alphabetical order of first authors)

**Aguiar, Amie\*** and **Bruce A. Young**, Department of Biology, Lafayette College, Easton, PA 18042. *Seabirds, Snakes, and Things that go Thump in the Night*. — Snakes can use groundborne vibrations for localizing prey, and some have proposed that such vibrations provide cues for cottonmouth snakes while foraging on fish that fall from bird rookeries. We tested the latter hypothesis by using fish and fish models to study the behavioral response of *Agkistrodon piscivorus* to groundborne vibrations and olfactory cues. Seabirds that nest on SeaHorse Key, a small island in the Gulf of Mexico, regularly drop fish in the vicinity of resident *A. piscivorus* while nesting. We found that presentation of an equivalent groundborne vibration, without associated chemosensory or visual stimuli, failed to induce overt foraging behavior from these snakes. However, presentation of a fish-based olfactory stimulus, without associated groundborne vibration or motion, triggered a foraging response in *A. piscivorus*. Specimens from two study sites reacted differently to the olfactory stimulus; those from the site with less ground cover and fewer snakes exhibited a weaker response. (76)

**Alexander, Scott\***, PA DEP, BMR, Division of Environmental Analysis and Support, RCSOB, Harrisburg, PA 17105; **Shaun L. Busler**, Stream Restoration Inc., Cranberry Twp., PA 16066; **Heath Gamache** and **Todd Garcia-Bish**, Lutherlyn Environmental Education Program, Prospect, PA 16052. *Initial Assessment of Semiconon Run*. — An assessment of Semiconon Run, Butler County, Pennsylvania, was conducted in the summer of 2002. Semiconon Run is a tributary of Little Connoquenessing Creek, Ohio River Basin. This high gradient stream has overall optimal habitat conditions with an epifaunal substrate, frequent riffles, and extensive riparian buffer. Presently, two major discharges from abandoned coal mines contribute iron and acid loading and significantly impact the stream. Due to this stream degradation, the numbers of individuals and kind of taxa were lower than could be found in a physically similar

stream. No macroinvertebrates were found directly downstream of the discharges; however, after aeration, precipitation, and dilution of the metals, macroinvertebrate communities returned. With the construction of a passive system in the headwaters of the watershed in 2003, more than a ton of iron will be eliminated from the stream every year and will help restore 2.4 miles of stream. (39)

**Allen, Sariah\***, **Daneen Grossman\*** and **K. Joy Karnas**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Accessory Proteins and Their Involvement in Lipoprotein Synthesis*. — Lipoproteins are used for cholesterol transport in multicellular organisms. Little is known about the biosynthesis of these protein/lipid complexes, but alterations in blood serum levels of lipoproteins have been implicated in several human diseases. One such disease is the rare autosomal recessive metabolism disorder, Tangier's Disease, characterized by low serum levels of both cholesterol and lipoproteins. The lack of cholesterol efflux is caused by a mutation in the ATP binding cassette transporter (ABC-1). It is not known whether this protein also effects the production of lipoproteins, or if other proteins in the secretory pathway are involved. This study examines the effect that accessory proteins have on the production of lipoproteins from the tobacco hornworm, *Manduca sexta*. First, RNA interference (RNAi) was used in a *Drosophila* S2 cell system to investigate the effect that proteins such as ABC-1 and the signal sequence receptor have on the synthesis of lipoproteins. Secondly, the signal sequence of the apolipoprotein was switched with the signal of an other secreted protein to determine its importance in lipoprotein production. (91)

**Altmeier, Michael\***, **Amie Aguiar** and **Bruce A. Young**, Department of Biology, Lafayette College, Easton, PA 18042. *Kinematic Modulation of the Strike of the Egyptian Cobra (*Naja haje*)*. — We used high-speed digital videography to explore the kinematics of the strike in Egyptian

cobras. Strikes were induced within a filming chamber, and the video record streamed to computer for frame-by-frame quantification with a 2 milisecond resolution. To determine the relative plasticity of the strike, four adult cobras were filmed performing multiple predatory and defensive strikes at different sized targets. For the predatory trials, the cobras struck at small and large live mice; for the defensive trials the same cobras were recorded striking at a large stuffed doll and at pre-killed large mice. Comparing the kinematic variables of the strikes directed at the large mice under predatory and defensive conditions enabled us to document modulation of the strike due to behavioral context. From each strike we quantified and compared multiple linear and angular displacements of the skull and lower jaw, as well as variables relating to temporal duration and velocity. (71)

**Appleman, Christina\***, **Carrie A. Monroe** and **Mel Zimmerman**, Department of Biology, Lycoming College, Williamsport, PA 17701. *Environmental Assessments of Muncy Creek Watershed - Monitoring of Water Chemistry, Macroinvertebrates and Fish Before, During and After Stream Restoration*. — Stream bank erosion is evident and of great concern in certain areas of Muncy Creek, particularly between Sonestown and Nordmont (Sullivan County, PA). Water chemistry, macroinvertebrate samples and fish data have been collected at 15 sites along Muncy Creek from the headwaters to the confluence with the West Branch of the Susquehanna River, and at 5 major tributaries to the creek since 2000. The first natural stream channel design restoration effort to correct erosion was performed at the Gavitt site during the summer 2002. Before construction began at this site, all data indicated a healthy creek, with the exception of the erosion on both banks between Sonestown and Nordmont. During construction, heavy machinery was used to place large boulders in the creek, resulting in disruption of substrate, benthic macroinvertebrates and the fish communities. However, sample collection following completion of construction on the Gavitt site indicated that the creek maintained its health since the commencement of the restoration efforts. (121)

**Auro, Maureen\***, **Tracey Hagen** and **Kimberly Lavalley**, Department of Biology, Lafayette College, Easton, PA 18042. *Does Colonization Time Influence Macroinvertebrate Community Measures on Artificial Substrates?* — We examined how sampling period affected macroinvertebrate communities using Hester Dendy multi-plate samplers. After deployment, duplicate samplers were recovered at riffles and pools weekly for 2–6 weeks. Abundance varied by an order of magnitude (20–250 invertebrates). Richness ranged from 8–25 taxa/sample. Simpson's Diversity (D) for riffles was 0.58–0.91 (mean=0.81±0.06 SE), while pool diversity was 10% higher, but less variable. Shannon Diversity (H') exceeded D, more so in riffles (12%) than in pools (8.6%). Plots of macroinvertebrate abundance and richness over colonization time yielded positive slopes overall. How-

ever, location-dependent abundance shifted, with riffle abundance exceeding pool initially, but after 4 weeks, pool exceeded riffle abundance. We suggest a 5-week colonization period when using these samplers. (36)

**Barker, Nicholas D.**, **Christopher M. Meharg** and **Thomas C. Peeler**, Department of Biology, Susquehanna University, Selinsgrove, PA 17870. *The Effects of Angiotensin II and Bradykinin Stimulation on Cytoskeletal Rearrangement in Neonatal Rat Cardiac Cells*. — Cardiac hypertrophy may occur in response to hypertension, a serious health problem in the United States. Angiotensin II (AII) has been shown to stimulate cardiac hypertrophy both in vivo and in vitro. Cardiac fibroblasts in vitro exhibit increased actin filament and focal adhesion expression when stimulated with AII. Recent studies have shown that bradykinin inhibits cardiac hypertrophy in vivo. Using fluorescence microscopy, we tested whether bradykinin stimulation affected cytoskeletal structure in cardiac fibroblasts. Our results suggest that bradykinin reduces actin filament and focal adhesion expression in cardiac fibroblasts. When cardiac fibroblasts are treated with both angiotensin II and bradykinin there is no change in actin filament and focal adhesion expression when compared to untreated cardiac fibroblasts. Thus while AII stimulates cytoskeletal rearrangement by increasing the number of focal adhesions, bradykinin seems to inhibit the cytoskeletal effects of AII. (95)

**Barscheski, Gerard\*** and **Ronald C. Kaltreider**, Department of Biology, York College of Pennsylvania, York, PA 17405. *Effect of Creatine Treatment on Insulin Receptor Activity*. — Diabetes Mellitus, which afflicts 17 million in the U.S., is characterized by a lack of circulating blood glucose clearance resulting from reduced function of the insulin receptor (IR). Upon activation, IR undergoes autophosphorylation, recruits and phosphorylates insulin receptor substrate (IRS)-1, to signal the translocation and insertion of high efficiency glucose transports into the cell membrane. Creatine, which is found in red meat, has recently has been shown to reduce circulating blood glucose levels, but little is known about the mechanism by which this occurs. The goal of this study was to determine if creatine synergistically increased insulin-induced activity of IR. H4IIE rat hepatoma cells were pretreated (0–24hr) with 100 uM creatine monohydrate then stimulated with 50 nM insulin. Protein lysates were isolated and the level of phosphorylation of the IR and IRS-1 were determined through immunoprecipitation and western blot analysis the results of which will be presented. (99)

**Beyer, Andrea R.\*** and **Alan B. Hale**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Harvesting Prophage from Geographically-Distinct Populations of Bacteria*. — Genetic variation within and among distinct taxonomic groups is an important character-

istic of natural populations. Relatively recently it has become clear that bacteriophage, viruses that infect bacteria, easily outnumber bacteria within many ecological systems. Our study is focused primarily on how to efficiently harvest prophage, viral genomes that are incorporated into the bacterial host genomes, from soil and aquatic bacteria for subsequent studies of genetic variation. Many strains of *Janthinobacterium lividum* have been collected from a diversity of ecosystems throughout the United States. Given that most temperate bacteriophage possess the cI gene, a gene that enables the viral DNA to remain within the host genome, PCR amplification of this gene is used to determine the presence of prophage within our strains of *J. lividum*. Harvesting prophage from host genomes using UV induction and mitomycin C protocols is minimally successful. Chemical, nutrient and temperature based protocols are currently being tested for better yields. (126)

**Bieniek, Kimberly N.\*, Leanne M. Follweiler\*, Megan W. Miller\*** and **Alan B. Hale**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Sequence Analyses of Temperate and Virulent Bacteriophages Infecting a Common Host Species*. — KLphi1 and MDphi1 are two bacteriophage that infect genetically distinct strains of *Janthinobacterium lividum*. DNA sequences of KLphi1, a temperate phage with an estimated genome size of 40 kb, have been compared with sequences of MDphi1, a virulent bacteriophage with an estimated genome size of 45 kb. To date, sequence comparisons of KLphi1 and MDphi1 indicate approximately 90% identity between the distinct phage. On a broader scale, KLphi1, which is almost completely sequenced, shows a high degree of similarity to phiCTX, a phage that infects *Pseudomonas aeruginosa*. MDphi1, on the other hand, shows sequence similarities to lambda, a phage that infects *Escherichia coli*. Both *P. aeruginosa* and *E. coli* belong to the taxonomic class Gammaproteobacteria, whereas *J. lividum* belongs to the class Betaproteobacteria. If it is true that phage were ultimately derived from host genomes, the putative homologies across classes suggest an interesting form of phage evolution. (102)

**Black, Theresa M.\*, Amy Curry and Mel Zimmerman**, Department of Biology, Lycoming College, Williamsport, PA 17701. *Lycoming Creek Erosion Evaluation*. — During the Summer 2002, Lycoming College interns walked or floated the entire stretch of the Lycoming Creek between Roaring Branch and lower Heshbon Road, a distance of 28 miles, in order to assess erosion and sites and other disturbances affecting the creek. A total of 245 observations were noted. Of these, there were 16 bridges, 28 midchannel bars, 32 deposition bars, 18 areas of rip rap, 8 tributaries, and 17 concrete walls, many from old bridges that have been destroyed. Accounting for one of the disturbances was an area of dried creek bed south of roaring Branch. The creek started again about 1/4 mile down stream, where it was fed

by a tributary. Observations of low, medium and high erosion potential were documented on 108 sites. Right banks accounted for 58 of the 108 eroded banks, while left accounted for 50. Right and left banks are determined by facing downstream. This data is now being used to develop Natural Stream Restoration projects. (173)

**Blair, Meghan J.\*, Courtney M. Grundmayer, Rosemary T. Gownley and Daniel S. Townsend**, Department of Biology, University of Scranton, Scranton, PA 18510. *Recovery of an Herbaceous Plant Community Eight Years after Exclusion of White-tailed deer (Odocoileus virginianus)*. — Herbaceous plant communities in many eastern U.S. forests have been damaged by white-tailed deer overbrowsing. We studied recovery by herbaceous plants in two 0.7 ha deer exclosures, eight years after construction, at Lacawac Sanctuary in northeastern Pennsylvania. The exclosures were about 300m apart in forest stands of different composition; one dominated by hemlock, the other by red oak and red maple. We identified and measured abundance, plant size, and reproductive status of herbs in random plots inside and outside of each exclosure. Herb species richness and total abundance (all species) were higher inside exclosures, but significantly so only in the deciduous stand. For most species, abundance and plant size were significantly greater inside exclosures. The number of species that flowered or fruited was significantly greater inside exclosures, as were densities of flowering/fruited stems for many herbs. Despite annual hunts, deer browsing continues to devastate the herbaceous community at Lacawac Sanctuary. (130)

**Boehmler, Jessica M.\***, Department of Biological Sciences, York College of Pennsylvania, York, Pa, 17405. *Cloning and Expression of a Novel GFP:Botox Fusion Protein from a Prokaryotic Expression System*. — Botulinum neurotoxin (botox), found on the list of potential biological weapons, is the most lethal protein yet discovered. Research into the protein has shown that its poisoning domain is structurally and functionally distinct from its cell-binding domain. Although binding of botox to neurons is a crucial step in its poisoning pathway, its binding mechanism remains unclear. To address these questions, a safe, useful form of botox was developed. This novel recombinant protein combines the binding domain of botox with green fluorescent protein, eliminating the poisoning component of the toxin. The DNA sequence for the binding domain of botox serotype A was fused to the 3' end of the GFP gene. This construct was subsequently cloned into a prokaryotic expression vector, allowing the GFP:Botox A fusion protein to be expressed in and purified from *E. coli*. Characterization of the binding properties of the purified GFP:BotoxA protein are underway. (111)

**Bradley, Gaylen B. \***, Penn State College of Medicine, Hershey, PA 17033-2360. *Responsible Conduct of Research: Plagiarism*. — Plagiarism is cited by colleges and the

National Science Foundation as the most frequent breach of scientific and academic integrity. There is little agreement on the definition of plagiarism. Plagiarism is confused with copyright violation, failure to attribute source, and even failure to use quotation marks. Although the National Science Foundation reports plagiarism as its most frequent breach of responsible conduct of research, the Office of Research Integrity reports a low incidence of plagiarism and relatively high incidences of falsification and fabrication. Use of computer programs that scan text for identical passages has led to claims of high incidences of plagiarism, but most of these claims are based upon use of repetitive phraseology in Methods sections. There is no generally agreed upon standard for citation of material taken from the Internet, much of which is not archived for later retrieval. A consistent definition of plagiarism is needed. (44a)

**Brashear, Heidi\* and Jane F. Cavender**, Department of Biology, Elizabethtown College, Elizabethtown, PA 17022. *Simian Virus 40 T-Antigen Not Localized In the Nucleolus as Observed Through Immunofluorescence*. — The current postulated mechanism for the transactivation of the ribosomal gene promoter by simian virus 40 (SV40) T-antigen necessitates the presence of the oncoprotein in the nucleolus. However, numerous publications have shown that immunofluorescence staining of T antigen and the nucleoli are clearly devoid of the protein. This study was designed to reconcile these conflicting reports. By using Cos-1 cells, which endogenously express T antigen, and TC7 cells as a negative control, antibodies to T-antigen, and the nucleolar protein B23, were used for immunofluorescent detection of proteins in the nuclei and nucleoli. Cells expressing T-antigen showed nuclear fluorescence with the T-antigen antibody and nucleolar fluorescence with the B23 antibody. Contrary to the postulated mechanism, the cells did not show nucleolar fluorescence when treated with the T-antigen antibody. These results suggest that T-antigen does not localize to the nucleolus and thus may transactivate the ribosomal promoter via a different mechanism. (55)

**Brashear, Heidi, Ashley Petrylak\* and Jane F. Cavender**, Department of Biology, Elizabethtown College, Elizabethtown, PA 17022. *Preparation and Staining of Human Diploid Fibroblast Metaphase Spreads for Observation of the Nucleolar Organizing Regions*. — Simian virus 40 (SV40) T-antigen transactivates the ribosomal gene promoter. To elucidate if the mechanism involves the reactivation of silent ribosomal gene promoters, metaphase spreads of human diploid fibroblasts (HDF) were prepared. The spreads were silver stained to detect active nucleolar organizing regions (NOR). If T-antigen turns on silent ribosomal gene promoters, then the number of chromosomes bearing active NORs will increase when T antigen is present. If the silent ribosomal genes are not activated, then the transactivation may occur as an up-regulation of previously active promoters. The procedure for creating the chromosome

spreads varies depending upon the cell line. We have found that HDF cells treated for 10-30 minutes in colcemid followed by hypotonic swelling in buffer ranging from 0.075 and 0.025 M KCl. produce chromosomes that are sufficiently condensed and well spread apart. The protocol for silver nitrate staining is being refined to produce consistent silver NORs. (106)

**Brenner-Zalewski, Elaine K.\***, Department of Biology, William Paterson University, Wayne, New Jersey 07470. *Distribution of Heavy Metals by Depth in a Section of the New Jersey Meadowlands, Secaucus, New Jersey*. — The New Jersey Meadowlands had been abused and neglected for nearly 50 years, receiving discharges from both municipal and industrial sources. During the last 20 years, efforts have been made to restore much of the natural water flow and to remove many of the contaminants from these estuarine wetlands. The question still remains as to the extent that earlier discharges still pose a risk to the wildlife that have returned to the region. The concentration of each of the 9 metals increased with increasing depth. The difference between each segment was not as large as was expected. The fact that the concentration of heavy metals appeared to be decreasing as one got closer to the surface has a significant impact on the apparent metal availability to wildlife as does the fact that the majority of the metals were found in forms not readily available to wildlife. These findings correspond to an earlier study by the same author. (31)

**Brenner-Zalewski, Elaine K.\***, Department of Biology, William Paterson University, Wayne, New Jersey 07470. *Phragmites australis: Is it as Bad as Ecologists Believe?* — It has long been believed that the invasive common reed, *Phragmites australis*, has absolutely no benefit in the wetlands of North America. It has long been seen as a benefit in Europe and is widely known to accumulate heavy metals. What has been disputed is *Phragmites'* benefit to wildlife. *Phragmites* is a species that can exist in either freshwater or brackish water and has been gradually pushing out the native wetland species, particularly in the estuarine wetlands of the east coast of the United States. Many organizations, both private and governmental, have been attempting to remove this species and restore the impacted wetlands to more native species. This research discusses the various benefits and impacts of *Phragmites australis*, both to ecosystems and wildlife. (88b)

**Brown, Michael\*, Yueh-Ju Hsiao, Kamran Kalim, Del Lucent, Eric Luther, Amy McEuen, Michael Steele and William Terzaghi**, Department Biology, Wilkes University, Wilkes-Barre, PA 18766; Peter Smallwood, University of Richmond, Richmond, VA. *Determining photosynthetic characteristics of red and white oak seedlings*. — We predict that red oak seedlings acclimate to differing conditions more readily than white oaks, because we have found that squirrels cache viable red oak acorns much more frequently

than those of white oaks. To test this hypothesis we have grown red and white oak seedlings under identical conditions and compared their photosynthetic characteristics. Red oak seedlings grown in a chamber become light-saturated at 500  $\mu\text{moles/m}^2/\text{sec}$ , whereas white oak seedlings grown alongside become light saturated at only 100  $\mu\text{moles/m}^2/\text{sec}$ . Compensation points are 30  $\mu\text{moles/m}^2/\text{sec}$  and 10  $\mu\text{moles/m}^2/\text{sec}$ , respectively, for red and white oak seedlings. These data indicate that red oak seedlings behave like sun plants, whereas white oaks behave like shade plants. We are now growing red and white oaks under a variety of light intensities in order to compare their abilities to acclimate to varying light regimes. (113)

**Brown, Sara E.\* and Sandra Holmes**, Department of Biology, Messiah College, Grantham, PA 17027. *Does circumstantial evidence and field data determine the Bolivian Iturralde feature as a Soft Sediment Impact Crater?* — The goal of this NASA study is to determine the validity of a soft sediment impact crater based on data collected and analyzed from the Iturralde feature. Validity is based on circumstantial evidence, Landsat imagery and field data. Data is represented using Geographical Information System (GIS) capabilities and Global Positioning System coordinates (GPS). These are used to plot hypothetical stream locations, gravimeter survey of magnetism anomalies and soil core samples. Additional field data regarding vegetation succession obtained from soil core samples looks at pollen and pollen residues, patterns of dispersal, and other indicators of an impact. A search for meteoric material is being conducted at present to provide unequivocal evidence for an impact origin of the Iturralde feature. To date, results are inconclusive and further study is planned. (180)

**Budinetz, Tara H.\* and Diane M. Bridge**, Elizabethtown College, Elizabethtown, PA 17022. *Characterizing the Expression of the Paired-like Homeobox Gene Manacle in Hydra vulgaris*. — Members of the cnidarian genus *Hydra* are morphologically simple invertebrates which have long been subjects of developmental research. In *Hydra*, a new body axis must be established during bud formation, the mode of asexual reproduction seen in the genus. This process involves expression of multiple genes important in vertebrate axis development, including *Hydra* Wnt, Tcf, goosecoid, *Brachyury*, *FoxA*, and *Otx* genes. A novel homeobox gene known as manacle, with sequence similarity to goosecoid, is also expressed during bud formation. To gain insight into the role of manacle, we have characterized in detail its expression during bud formation. RNA in situ hybridization followed by sectioning indicates that manacle is expressed in the endoderm very early in bud formation. The expression pattern of manacle indicates that it could potentially regulate early *Brachyury* transcription, a role played by goosecoid during *Xenopus* early development. (48)

**Buerdsell, Karen\* and Brad E. Engle**, Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201. *Mycorrhizal Associations Between Canopy White Oak (Quercus alba) and Understory Dogwood (Cornus florida) Trees: Exploring the Link*. — To better understand the development of natural ecosystems, researchers are investigating mycorrhizal associations, the mutualistic relationships that form between the roots of a plant and the hyphae of a soil fungus. These associations may also provide a physical pathway for plants of different species to share essential nutrients and synthetic biomolecules. The mycorrhizal associations that form between two types of indigenous trees, canopy White Oaks and understory Dogwoods, were studied. Soil samples were taken from the dripline of the trees. Root fragments in the soil samples were then cultured for fungal growth and used to inoculate the soil of growth chambers containing a Dogwood seedling and a White Oak seedling. Once the fungus has established a network linking the two seedlings, a carbon probe will be introduced into the White Oak seedling and its progress tracked through the plant body, into the fungal network, and potentially into the Dogwood seedling. (3)

**Burns, Catherine\*, and Brian S. Misanko**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104; **Maryjane Cerrone**, Neurosciences and Pain Research, Lehigh Valley Hospital, Allentown, PA 18103. *Evaluation of the Use of Ketamine Gel Applied Topically Away from the Site of Pain in Patients with Neuropathic Pain*. — Recently published case studies on patients diagnosed with neuropathic pain reported that those who applied ketamine gel to the area of discomfort found it to be beneficial. Our belief is that the drug is absorbed systemically and that application away from the area of pain would give the patient pain relief. The objective of our study was to evaluate if ketamine gel applied to an area away from the pain site is effective in reducing pain, improving quality of life and functional status. Thirty patients were enrolled and randomly assigned to active drug or placebo. Patients were evaluated weekly, at week two "non-responders" were crossed over to the alternative arm. Patients recorded specific information in a daily diary. Data was analyzed to determine the efficacy of ketamine gel applied topically to an area away from the pain site. Our belief that patients who are experiencing neuropathic pain will benefit from the application of ketamine gel due to the central mechanism of action at the level of the NMDA receptor. (142)

**Campbell, J. Michael\*, Greg Dore, Nevin Welte, SusAnne Sisak and Dave Adams**, Department of Biology, Mercyhurst College, Erie, PA 16546. *Assessment of benthic macroinvertebrate communities in the Presque Isle Bay watershed*. — Benthic macroinvertebrate communities of perennial streams that flow into Presque Isle Bay (PIB) plus several reference sites in Lake Erie tributaries in Pennsylvania outside of the PIB watershed were sampled on a season-

al basis during 2000–2001 using EPA rapid bioassessment protocols, to establish a monitoring baseline for evaluating remediation efforts to abate non-point source pollution (NPSP). Pollution-tolerant planarian flatworms, crustaceans, oligochaetes, leeches, and mollusks were common at most of the sites and streams sampled. Aquatic insects were represented by 9 different orders, 51 different families, and over 100 genera. Multimetric analyses indicated the expected outcome that heavily developed portions of the PIB watershed have the most severely degraded benthic macroinvertebrate communities. Limited portions of the watershed that contain residual populations of pollution-sensitive insects indicate reasonable chances of biological recovery of the streams if effective remediation of NPSP is achieved. (120)

**Campbell, J. Michael\*, Department of Biology, Mercyhurst College, Erie, PA 16546; Eric Obert**, Pennsylvania Sea Grant, Penn State Erie. *Impact of Invasive Species on the Biodiversity of Presque Isle, Erie County, Pennsylvania*. — During the past century, all of Presque Isle's major habitats have been affected in various ways by the establishment and spread of invasive species. Invasive species that have recently dominated in upland, wetland and aquatic habitats of the park (e.g. white-tailed deer, phragmites, Eurasian watermilfoil, zebra mussels, and round goby) have contributed to the extirpation or decline of previously abundant native plants and animals, although some native species of wildlife may in fact have benefited from these introductions. Recent efforts to control invasive plant species at Presque Isle have successfully restored native plant communities at selected sites on the park. However, greater progress is needed to develop management and monitoring tools that allow reduction of invasive populations while minimizing adverse impact on non-target species, and predictive models and monitoring aimed at preventing the establishment and spread of new invasive species. (87)

**Campbell, Matthew S.\*, Kyle J. Lorditch\*, Claudia E. Rocca, Timothy J. Scripko Jr. and Timothy J. Maret**, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Investigation of Competitive and Predatory Interactions Between Salamanders and Crayfish in Freshwater Streams*. — The interactions between salamanders and crayfish in small freshwater streams have not been well characterized and need to be examined further. In larger streams fish tend to be the dominant predator/competitor, but some question remains of the ecological relationship in streams where fish are absent. This research is directed towards investigating the relationships between larval two lined salamanders, *Eurycea bislineata*, and crayfish. This study includes a survey of several small streams, as well as laboratory experiments to characterize the general behavior and competitive interactions between these organisms for food and shelter. Our results indicate that when crayfish are present, salamander larvae are often excluded from available

shelter. Salamander larvae also suffer a high mortality rate in the presence of crayfish. Additionally, crayfish feed much more quickly than salamanders and may outcompete them for food. (153)

**Capozziello, Valerie P.**, Department of Biological Sciences, York College of Pennsylvania, York, Pa, 17405. *Inducing Apoptosis of Glioblastoma Multiforme Cells Using a Bcl-2 Specific siRNA Sequence*. — Glioblastoma multiforme (GBM) is the most common brain cancer of middle age Americans. Unfortunately, survival rates are typically less than 1 year from time of diagnosis. Following surgery, GBM patient typically endure chemical and radiotherapies to slow tumor regrowth. Research suggests that under these treatments GBM cells regress by entering apoptosis, or programmed cell death. We investigated the use of small interfering RNAs (siRNAs) to induce apoptosis in human GBM cells in vitro. Current research suggests that siRNAs eliminate a particular target protein from a cell by degrading the target's mRNA cellular pool. Bcl-2 is an anti-apoptotic protein in cells. Using Bcl-2 targeted siRNAs, we attempted to eliminate Bcl-2 from U87mg (human GBM) cells, cultured in vitro, inducing them into apoptosis. Preliminary data suggests that U87mg cell number is reduced (cell death enhanced) when treated with Bcl-2 siRNA compared to U87mg control cells, treated with a scrambled siRNA sequence. (89)

**Casper, Elyse A.\*, Christopher J. Graham\*, Kenneth L. Laws and Brian S. Pedersen**, Environmental Studies Department, Dickinson College, Carlisle, PA 17013. *Light Transmission Through a Forest Canopy*. — The collection of tree leaves, stems, and branches in a forest form the forest canopy, a body that modifies incident solar radiation. The effects of the canopy on light intensity have important consequences for trees and organisms living within and below the canopy. Measurements of autumn light levels in an open field and under a deciduous canopy were combined with measurements of canopy characteristics (canopy thickness, leaf area index, leaf inclination distribution, and leaf reflectivity) in preparation for developing and testing a computer model of canopy light transmission. Preliminary results show that (1) light transmission through the canopy is maximum 1.5 hours after noon (6%), (2) reflection from upper leaf surfaces is mostly diffuse, (3) leaf inclination follows a Gaussian distribution centered on 40 degrees above the horizontal, and (4) as autumn leaf fall progressed, a measurable amount of light penetrated the canopy at an earlier time each day. (159)

**Chester, Michael J.\* and Jason Foust**, Department of Chemistry and Physics, Mansfield University, Mansfield, PA 16933. *Stick-Slip Friction with Sandpaper and its Relation to Earthquakes*. — An experimental study of stick-slip friction was undertaken using sandpaper and paper towel as the interacting surfaces. Sandpaper was attached to the bot-

tom of a block that was connected by a spring to a stationary frame. Paper towel was dragged beneath the block while the position of the block was monitored with a linear displacement gauge. When the restoring force in the spring exceeded the maximum static friction force, the block slid back. The elastic potential energy released during these slip events was determined for nine different sandpaper grit sizes. Analysis of the data suggests that the distribution of energy released during slip events depends not only on sandpaper grit size, but also on the surface roughness of the paper towel. Furthermore, the distribution of slip events as a function of energy released has the same functional form as the Gutenberg-Richter law for earthquakes. (30)

**Christianson, Cheryl\*** and **Laurie Caslake**, Department of Biology, Lafayette College, Easton, PA 18042. *Functional Analysis of the sigB promoter in Synechococcus sp. Strain PCC 7002*. — Transcription of sigB, an alternate sigma factor of *Synechococcus* sp. strain PCC 7002, increases in response to nitrogen and carbon stress. The sigB promoter sequence was identified by mutating the -10 and -35 hexamer sequences. The 19 base pair interhexamer space within the promoter of sigB is longer than the 17 base pair spacing of the normal promoter. A pLAT4 plasmid vector encoding resistance to spectinomycin and containing the sigB promoter fused to lacZ was used to mutagenize the -10 and -35 hexamers via site-directed mutagenesis. Mutant plasmids were transformed into the cyanobacteria and selected on spectinomycin agar plates. LacZ assays on nitrogen starved cultures of the two mutants in the -10 hexamer and one mutant in the -35 hexamer will allow identification of important contacts for RNA polymerase at the sigB promoter. (12)

**Chronister, Angelique\*** and **Ronald C. Kaltreider**, Department of Biological Sciences, York College of Pennsylvania, York, Pa, 17405. *Advanced Placement (AP) Biology Program: A Better Program for the College-Bound Student*. — Two York county high schools offering either Advanced Placement (AP) biology or Honors Biology Programs were examined in this study. Our objective was to determine which program was more beneficial to college-bound biology students. Evaluations consisted of a pretest (September 2001) to determine the baseline biology knowledge and a posttest (May 2002) to determine the effectiveness of each program. Our exam had 104 questions, half from old AP exams and half from Biology I and II exams given at York College of Pennsylvania (YCP). This study indicated that the overall performance of AP students was significantly greater ( $p=0.022$ ) than that of Honors students. Neither the AP students nor the Honors students scored differently on the AP section compared to the YCP section. This study may help communities to decide which program to implement in their schools. (149)

**Cigliano, John A.\***, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104; **Bryan S. Bugler**, Beverly, MA 01915. *Status of Queen Conch (*Strombus gigas*) populations off of Andros Island, The Bahamas and an assessment of the probable effectiveness of recently established marine replenishment zones*. — The purpose of this study was to assess the status of queen conch (*Strombus gigas*), an important fishery in the Bahamas, along the eastern, central coast of Andros Island, Bahamas. The Bahamian government recently established two marine replenishment zones (MRZ) in this area to protect and replenish queen conch populations. Our objectives were to determine (1) spawning and nursery habitats, (2) density inside and outside the MRZs, and (3) whether adult density is above the threshold necessary for reproduction to occur. We sampled conch within 300 m<sup>2</sup> belt transects. We recorded depth, habitat type, and the number and age/size class of conch. Queen conch use Sargassum beds and seagrass beds as nursery grounds and spawning grounds, respectively. Densities inside and outside the MRZs did not differ. However, results suggest that the populations are threatened and that the MRZs may not contain sufficient sites to protect and replenish the conch fishery. (2)

**Claghorn, Tara Taws\***, The Morris Arboretum, Philadelphia, PA 19118. *The Biology and Control of the Japanese Mealybug at the Morris Arboretum*. — A population explosion of mealybugs occurred in the summer of 2002 on the landscape plants at the Morris Arboretum in Philadelphia, PA. At least two species, *Planococcus japonicus* and *Phenacoccus* spp., have been identified. *Planococcus japonicus*, the Japanese mealybug, represents a new record from Pennsylvania. Relatively little is known about the exact biology of most mealybugs and what factors cause their populations to increase. There is no specific information available about the Japanese mealybug, offering an excellent opportunity to learn from the population at the Arboretum. Weekly observation of the insect and various host plants is continuing to determine the life cycle and host range of this new pest. Other factors that may have contributed to the population surge such as drought, unusually warm winters, and the health of the host plant will also be evaluated to determine how they affect the biology of the pest. A treatment plan will be developed for the Arboretum that is based on the most vulnerable stage of the pest's life. (82)

**Clippinger, Amy\***, Department of Biology, Immaculata University, Immaculata, PA 19345. *Mother-Offspring Weaning Conflict in Guinea Pigs*. — In this experiment we tested an idea proposed by Trivers (1974) which states that younger mothers with greater reproductive potential will spend less time nursing their offspring than older mothers with diminished reproductive potential. To test Trivers' hypothesis, we followed four guinea pig families from birth to weaning using 24-hour video surveillance recordings. Two of the families had first time mothers; the other two had

second time mothers. We then analyzed the tapes to determine how the frequency of nursing in each family changed throughout the observational period. As the nursing period progressed, we observed that the first-time mothers in our group decreased their frequency of nursing more rapidly than did the second-time mothers. While the limited amount of data we were able to collect using just a few guinea pig families precluded a proper statistical analysis, our results are certainly consistent with Trivers' hypothesis. (42)

**Confer, Bradley D.\***, Department of Chemistry and Biochemistry, Elizabethtown College, Elizabethtown, PA 17022; **David J. Feith**, Department of Cellular and Molecular Physiology, The Penn State University College of Medicine, Hershey, PA 17033; **Anthony E. Pegg**, Department of Cellular and Molecular Physiology and Pharmacology, The Penn State University College of Medicine, Hershey, PA 17033. *Development and Characterization of Transgenic Mice Expressing and Antizyme in the Intestine and Colon*. — Ornithine decarboxylase (ODC) is the initial enzyme in the polyamine biosynthetic pathway and increased ODC activity is observed in colorectal cancer. Multiple intestinal neoplasia (Min/+) mice, which develop multiple adenomas in the intestine and colon, display increased ODC activity and polyamine levels in these tissues. Antizyme (AZ) is a negative regulator of polyamine metabolism and ODC activity. A liver fatty acid binding protein (FABP) promoter construct was produced to target the expression of epitope-tagged antizyme (HA-AZ) within intestinal and colonic epithelial cells of transgenic mice. Colon carcinoma cells transfected with the construct had reduced ODC activity. Two founder mice containing the FABP/HA-AZ transgene were identified and will be used to develop transgenic mouse lines. Ongoing studies will investigate the effect of HA-AZ expression on intestinal cell proliferation, differentiation and apoptosis. The FABP/HA-AZ mice provide an excellent model to evaluate the role of polyamines in intestinal carcinogenesis of Min/+ mice. (15)

**Coxe, Robert B.\***, Western Pennsylvania Conservancy, Pittsburgh, PA 15228. *A Natural Heritage Inventory of Mercer County, PA*. — During 2001 and 2002, an inventory of rare plant and animal species and their associated natural communities in Mercer County was conducted. Rare species locations and natural communities were recorded and classified. Nineteen new locations for plant species of special concern were found and twenty natural communities were documented from a total of 121 sites surveyed. Common communities include Red oak-mixed hardwood forest and tuliptree-beech-maple forest on uplands, and sycamore-(river birch) box-elder floodplain forest along rivers and major streams. Buttonbush wetlands, wet meadows, bottomland oak swamp forests and skunk cabbage-golden saxifrage seeps comprised most wetlands. Community typing followed the Pennsylvania Natural Diversity Inventory publication Terrestrial and Palustrine Plant Communities of

Pennsylvania. A total of seven county record species were found including *Acer nigrum*, *Alliaria petiolata*, *Carex leptalea*, *Epilobium strictum*, *Frangula alnus*, *Urtica dioica* sp. *dioica* and *Viola appalachensis*. (8)

**Coxe, Robert B. \***, Western Pennsylvania Conservancy, 209 Fourth Avenue, Pittsburgh, PA 15222. *Invasive plant species encounters while doing County Natural Heritage Inventories in Western Pennsylvania*. — County Natural Heritage Inventories document places of natural significance at the county and state level. To do this sites are visited and data is recorded on site condition, community type, species present and threats to rare species. By default invasive species present are recorded and are sometimes county records. Recently completed counties for Western Pennsylvania include Fayette, Lawrence and Mercer, while updates were finished in Centre and Clinton Counties. Common exotic invasive species include *Polygonum cuspidatum*, *Rosa multiflora*, *Alliaria petiolata*, *Berberis thunbergii* and *Lythrum salicaria*. One native species, *Vitis aestivalis*, is invasive in disturbed areas of Fayette County. *Berberis thunbergii* and *Alliaria petiolata* were county records in Fayette County. *Celastrus orbiculatus* and *Epilobium hirsutum* were county records in Lawrence County. *Alliaria petiolata* and *Frangula alnus* were county records in Mercer County. (88a)

**Cramer, Sherry A.\*** and **Karl W. Kleiner**, Department of Biological Sciences, York College of Pennsylvania, York, PA 17405. *Evaluation of Soil Microbial Communities Between Black Locust (*Robinia pseudoacacia*) and Tulip Poplar (*Liriodendron tulipifera*) in a Pennsylvania forest*. — Soil microbial communities are strongly linked with the diversity in plant communities. However, there can be species-specific plant effects on soil microbe populations. We compared the diversity of microbial communities from the soil around tulip poplar (*Liriodendron tulipifera*) and black locust (*Robinia pseudoacacia*) trees in a mid-successional forest in York County, Pennsylvania. Black locust is a nitrogen-fixing tree species that is known to contribute substantial amounts of nitrogen to the soil. We hypothesized that there would be lower microbial diversity around the nitrogen-fixing black locust tree when compared to tulip poplar. We evaluated the functional diversity of microbial communities using Biolog EcoPlates. There was no difference in the Average Well Color Development (AWCD) between the different tree species, nor was AWCD correlated with soil nitrogen. (155)

**Curilla, Susan\*** and **Ronald C. Kaltreider**, Department of Biological Sciences, York College of Pennsylvania, York, PA 17405. *Effect of Advanced Glycation End-Products (AGEs) on Hypoxia Inducible Factor (HIF)-1 $\alpha$  Activation and Partnering*. — Diabetic retinopathy, the leading cause of blindness in the U.S., is characterized by biochemical and morphological changes within the eye resulting in blood

vessel proliferation and apoptosis, or cell death. While the mechanism of this process is unknown, a cytosolic transcription factor hypoxia inducible factor (HIF)-1 $\alpha$  appears to be important in this process. It associates with both aryl hydrocarbon nuclear translocator (ARNT) to induce proliferation and p53 to induce apoptosis. Advanced glycation end-products (AGEs), which are produced in hyperglycemic conditions, induce HIF-1 $\alpha$  and have been linked to changes within the retinal cells observed in diabetics presenting retinopathy. Our goal was to determine the role AGEs have in HIF-1 $\alpha$  activation and partnering to ARNT and p53. Human Retinal Pigment Epithelia (RPE) cells were treated for 4 hr with AGEs (10-500  $\mu$ g/ml) and HIF-1 $\alpha$  levels and partnering to ARNT and p53 were determined using western blot analysis. These results will be reported. (100)

**Daniels, Amy M.\*, Marcie L. Baer and Timothy J. Maret**, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Genetic Analysis of Population Structure of Vernal Pond Ambystomatid Salamanders*. — Vernal pool communities are being threatened by development and currently receive little protection in Pennsylvania. Since ambystomatid salamander populations are an important component of these communities, understanding the population structure and migration patterns will aid in the development of conservation strategies of vernal pool communities. Larval tissue samples (tail snips) of *Ambystoma opacum*, *Ambystoma maculatum*, and *Ambystoma jeffersonianum* were collected in the summer of 2002 from different geographical areas in southcentral Pennsylvania. RAPD analysis of genomic DNA utilizing two different primer sets (GGGAATTCGG, GGCTGCAGAA) displayed unique species patterns. Within species, preliminary results from four ponds demonstrate genetic differences between ponds. Population structure and estimated rate of movement will be determined using population genetics software. (9)

**Dechtiaruk, Anna M. \*, Becki M. Bert\* and Margaret T. Peeler**, Department of Biology, Susquehanna University, Selinsgrove, PA 17870. *Wnt Signaling During Sea Urchin Embryonic Cell Specification*. — The precursors to sea urchin primary mesenchyme cells (PMCs) play a critical role in the organization of the embryo along the animal to vegetal axis, specifically by conveying vegetalizing signals to adjacent blastomeres. Recently, several labs have identified components of the beta-catenin signaling pathway as being involved in this process, including beta-catenin, TCF, GSK-3, and others. A homologue of wnt, the extracellular signal known to stimulate this signaling pathway in many other developmental systems, has been identified as part of the sea urchin genome project. We have cloned a homologue of wnt in the sea urchin species *Lytechinus pictus*, and hypothesize that this signal may be involved in the early stages of cell fate determination in the embryo. We are characterizing the timing and spatial regulation of expression of this protein during development. The identification of

expression patterns for wnt that are correlated with beta-catenin nuclear localization may suggest a role for wnt in vegetal cell specification. (93)

**Devlin, Kate\* and Elaine R. Reynolds**, Department of Biology, Lafayette College, Easton, PA 18042. *An Exploration for the Neural Locus of Bang-sensitivity in the Drosophila Brain*. — *Drosophila* bang-sensitive mutants display a stereotypic seizure behavior in response to mechanical shock and either hot or cold temperature. Based on a detailed analysis of the seizure phenotype in response to cold, *bangsenseless* (*bss*) flies contract muscles in a rigid seizure, relax and remain motionless for about 20 sec and then undergo violent seizures that involve coordinated contraction of all muscle sets. These coordinated seizures must originate in the central nervous system rather than individual muscle sets. A scheme was devised to look for the origin of the seizures in these mutants, using a Gal4-UAS system to shut down neural transmission in specific regions of the nervous system. Flies were constructed containing various Gal 4 enhancers, a UAS- *shibere<sup>ts</sup>* construct in a wild-type and mutant background. The flies were then subjected to high temperature and the behavior was analyzed. Results from an initial set of brain regions will be presented. (53)

**DiLeo, Matthew\*, Kyle Shoenberger, Nicholas Peacock, Rohit Rajoria, Robert Dawley and Mary Fields**, Department of Biology, Ursinus College, Collegeville, PA 19426. *Investigation of Genome Size in Mimulus guttatus and Mimulus nasutus (Scrophulariaceae)*. — *Mimulus* is an excellent model to use in the study of evolution and species divergence because its species are clustered into sections and complexes, allowing comparisons of traits between related species. Four populations of *M. guttatus* and five populations of *M. nasutus* were examined using flow cytometry to determine the amount of DNA within each plant diploid genome. Each plant was evaluated for variation in the diploid genome size, and the tendency towards aneuploidy and polyploidy between and within species. We found a significant difference in genome size between *M. guttatus* and *M. nasutus* and between individual populations of *M. nasutus* that were found on opposite sides of a genome size gradient. About 10% of cells within our sample tissue were tetraploid regardless of species or population. We found aneuploidy in two size classes that were specific to certain populations. Supported by grants from HHMI and NSF (ILI Grant #92050888). (129)

**Dobracki, Alyson\* and Frank T. Kuserk**, Department of Biology, Moravian College, Bethlehem, PA 18018. *Isolation and Identification of Chitinolytic Bacteria from the Northern Pitcher Plant, Sarracenia purpurea*. — The Northern Pitcher Plant, *Sarracenia purpurea*, is a common inhabitant of acidic peatlands across eastern North America. These carnivorous plants obtain organic nitrogen and other nutrients by trapping and digesting arthropod prey that fall into their

pitcher-like leaves. Since chitin is the primary component of arthropod exoskeletons, it is likely that chitinolytic bacteria are a major component of the pitchers' microbial communities and their production of the enzyme chitinase may play a significant role in the breakdown of this polymer. Water from the leaves of *S. purpurea* plants located at Tannersville Cranberry Bog (Monroe County, PA) were collected and inoculated into enrichment media containing chitin as the sole carbon and nitrogen source. Samples were streaked onto chitin agar plates and nineteen bacterial isolates were obtained and identified using the Biolog Microbial Identification System. These isolates represent thirteen species and seven bacterial genera, with the most common belonging to *Pseudomonas* and *Serratia*. (139)

**Donovall, Leo R. III\*, Joseph K. Sheldon and Christopher Heidenreich**, Department of Natural Sciences, Messiah College, Grantham, PA 17027. *The Grasshoppers (Orthoptera: Acrididae) of Pennsylvania*. — A five-year study, beginning in 2000, is being conducted on the diversity and distribution of Pennsylvania's grasshoppers (Orthoptera: Acrididae). Fifty-three species representing five subfamilies have been identified within the collections of the Academy of Natural Sciences and the Pennsylvania State University's Frost Entomological Museum. Materials from the Carnegie Museum of Natural History, the Smithsonian Institute and the Pennsylvania Department of Agriculture have yet to be reviewed. From these collections and other materials, identification keys and species distribution maps have been made. The results of the study will be published on the web for easy access and rapid updating. (69)

**Duffy, Kathleen\***, Department of Physics, Chestnut Hill College, Philadelphia, PA 19118. *Evolutionary Landscapes in Teilhard de Chardin*. — Biologists since Darwin have generally viewed natural selection as the main mechanism operative in evolution. Recently, complexity scientists have challenged this belief by introducing a second and, according to them, an equally important evolutionary mechanism, self-organization. Complexity scientists such as Stuart Kauffman attempt to model evolution via adaptive fitness landscapes. Writing in the early twentieth century, the Jesuit paleontologist, Pierre Teilhard de Chardin alluded to both the image of a landscape and a dynamic technique called the kinematic technique used by paleontologists of his day when studying evolution. In some way, Teilhard seems to have intuited the science of complexity which provides a more holistic approach to the study of evolution. In this paper, after a brief introduction to fitness landscapes and the thought of Teilhard de Chardin, I will discuss parallels between the two and show how the use of modern methods of landscape analysis enhances Teilhard's synthesis. (67)

**Dunlap, Karen\*, Meredith Singer, Kristen Koenig and Bruce A. Young**, Department of Biology, Lafayette College, Easton, PA 18042. *Functional Convergence in the Venom*

*Delivery System of Snakes*. — The venom delivery system appears to have evolved independently in several lineages of snakes. The multiple phylogenetic roots of this system are reflected in differences in the morphology of the fang, venom gland, and extrinsic venom gland musculature, as well as in maxillary kinematics during venom expulsion. Despite these anatomical differences, all venomous snakes face the same functional challenge, to rapidly inject pressurized venom into a target organism's tissues. By comparing the mechanics of venom injection in a representative viper (the western diamondback rattlesnake, *Crotalus atrox*) to that of a representative elapid (cobras of the genus *Naja*), we sought to document the extent of functional convergence in venom delivery. Both groups' venom delivery systems were examined using high-speed digital videography, gross and microscopic anatomy, and experimental manipulation. Our results suggest that the venom delivery systems of these two lineages have functionally converged to overcome the shared challenges of venom injection. (72)

**El Bayadi, George\* and Daniel S. Townsend**, Department of Biology, University of Scranton, Scranton, PA 18510. *Refuges Indicate the Effects of Overbrowsing on Herbaceous Plant Communities in a Northern Hardwood Forest*. — Overbrowsing by white-tailed deer (*Odocoileus virginianus*) is devastating plant communities in northern hardwood forests. We compared the herbaceous plant communities of refuges (ledges, boulders and tip-up mounds where deer cannot browse) with those of adjacent control plots (where deer browse) at Lacawac Sanctuary in northeastern Pennsylvania. On ledges, herbaceous plants exhibited significantly greater species richness, density, species diversity and reproduction than in control plots. Richness, density and diversity were each significantly correlated with refuge size. The significant reproductive responses of herbs in refuges suggest their potential importance as sources for recruitment in the recovery of browse-damaged forests. Although smaller refuges (boulders and tip-up mounds) had lower richness and abundance, they hosted herbaceous species that were absent or rare in browsed forest. Overbrowsing continues to devastate the herbaceous community at Lacawac Sanctuary, but refuges represent a significant potential source for recovery once deer densities are controlled. (127)

**Ellerman, Angela\*, Brandi Swietkoski and David S. Richard**, Department of Biology, Susquehanna University, Selinsgrove, Pennsylvania 17870. *Regulation of the Insulin-receptor Substrate Gene (chico) during Reproductive-diapause Termination in Drosophila melanogaster*. — Dipteran insects such as *Glossinia* (tsetse fly) infect many people with sleeping sickness, and agricultural pests such as *Ceratitidis capitata* (Mediterranean fruit fly) cost millions of dollars in agricultural crop damage each year. The development of rational insect control strategies may require an understanding of reproductive development. Thus, *Drosophila melanogaster* (Diptera) provides a model to study the

involvement of juvenile hormones (JH) and ecdysteroids in the endocrine regulation of vitellogenesis, (the production and uptake of yolk proteins into developing oocytes) in these species. Recent investigations have implicated the *Drosophila* insulin-receptor substrate gene (*chico*) in the induction of receptor-mediated endocytosis of yolk proteins by developing oocytes. In diapausing females vitellogenesis is arrested, yet injection with 11ng of 20-hydroxyecdysone can terminate this over-wintering condition. RT-PCR data regarding the expression of *chico* in diapausing Canton S flies following injections will be presented. Supported in part by NIH grant #GM/OD54905 to DSR. (11)

**Faivre, Amy E.\***, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Self-Incompatibility Systems and Pollinators of Six Understory Psychotria Species on Barro Colorado Island, Panama.* — Distylous plants produce flowers of two different morphologies and have a unique self-incompatibility system. The reproductive biology of six *Psychotria* species (genus containing greatest number of distylous members) was studied on Barro Colorado Island, Panama. Hand-pollinations were done on bagged flowers of *Psychotria acuminata*, *P. chagrensis*, *P. deflexa*, *P. hoffmannseggiana*, *P. horizontalis*, and *P. ipecacuanha*. With the exception of *P. hoffmannseggiana*, these species are distylous. Pollen tubes from hand-pollinations were observed using fluorescence microscopy. Preliminary results suggest that *P. chagrensis*, *P. horizontalis*, and *P. ipecacuanha* have somewhat typical distylous incompatibility systems. However, there are differences in incompatibility expression between long-styled and short-styled flowers of *P. acuminata* and *P. deflexa*. *Psychotria hoffmannseggiana* is self-compatible. Insect visitors to each species were observed. *Psychotria horizontalis* had numerous visitors, but the other psychotrias were most frequently visited by six bee species: *Osiris mourei*, *Osiris* sp., *Paratrapedia calcarata*, *Paratrapedia* sp., *Trigona fulviventris*, and *Trigona pallens*. (79)

**Faix, Michael R.** and **John D. Peles\***, Pennsylvania State University McKeesport, McKeesport, PA 15132; **Janet Wright**, Department of Biology, Dickinson College, Carlisle, PA 17013. *Den Affinity and Movement Patterns of the Allegheny Woodrat (Neotoma magister) in Southwestern Pennsylvania.* — Management efforts aimed at the preservation and recovery of the Allegheny woodrat (*Neotoma magister*) have been hindered by a lack of information concerning habitat use and spatial distribution of individuals within populations. We monitored den locations of 10 radio-collared woodrats (3 male, 7 female) at two sites in southwestern Pennsylvania from 24 June & #8211; 26 July and 19 August & #8211; 20 September 2002. A total of 17 den sites were located during the monitoring periods. Although quality of den sites differed little between sexes, males spent a larger percentage (60%) of time at peripheral den sites (i.e., sites >25 m from main rock outcrops) com-

pared to females (35%). Mean number of den relocations (~1 per individual) and mean residency time (~20 days) were similar for both monitoring periods. Mean nearest neighbor distance between two dens occupied simultaneously for >2 days was 19.8 m. Results suggest that spatial arrangement of available den sites, and the availability of peripheral den sites, may be important factors in determining population size. (163)

**Fischman, Sarah\*, Jeffrey Obrzut** and **Thomas McGuire**, Department of Biology, Penn State Abington, Abington, PA 19001. *Isolation of Unculturable Microorganisms from Marine Sediment.* — Most bacteria cannot be grown in pure culture outside of their natural environments. To overcome this problem, an artificial environment was created in an aquarium using transported intertidal marine sediment from Ocean City, NJ. Bacteria were removed from the sediment by vortexing and were mixed with semisolid agar supplemented with casein. This mixture was placed in the center of a diffusion chamber composed of a stainless steel washer both sides of which were sealed with semipermeable 0.03-mm pore size polycarbonate membranes. The diffusion chambers were placed in the artificial environment so interaction with nutrients in the sediment could occur. Initial results from crystal violet-stained samples indicate that this is an effective method to culture apparently pure cultures of bacteria living in marine sediment. (140)

**Fotter, Erin\*** and **M. Dana Harriger**, Department of Biology, Wilson College, Chambersburg, PA 17201. *Differentiation and Characterization of the Murine Oligodendrocytic Cell Lineage in vitro Utilizing Ultrastructural and Histochemical Techniques.* — Approximately 300,000 Americans are afflicted with Multiple Sclerosis (MS), an autoimmune disorder that attacks the myelin coating around axons causing neural conduction to be slowed and/or disrupted. Myelin is produced by oligodendrocytes, microglial cells which differentiate through five stages: Pre-O2A, Progenitor, Pro-oligodendroblast, Immature, and Mature myelinating. In this study, oligodendrocytic precursor cells were isolated from postnatal 2-day rat pups, cultured and induced to differentiate for 5 days. Parallel cultures were fixed at 12-hour intervals and developmental stages were characterized utilizing immuno-histochemistry and scanning electron microscopy. All stages of the oligodendrocytic pathway were identified. Of interest was the persistence of undifferentiated cells throughout the cultures. Results of this study could lead to further understanding of the induction and migration of oligodendrocytic cells to the myelinating stage. By continuing to characterize properties of these cells in vitro, information can be applied in vivo to potentially control myelin disorders of the nervous system. (16)

**Gablik, Joanne E.\***, **Elizabeth A. Schofield\*** and **Kent K. Fitzgerald**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Determination of the Effects*

*of Piper methysticum, a Botanical Anticonvulsant, on Calcium Levels in Retzius Neurons of Hirudo medicinalis.* — Kava, *Piper methysticum*, is a tropical plant used as a botanical anticonvulsant and sedative. Kavalactones have been shown to diminish sodium and calcium currents in neurons, an action shared by other anticonvulsant medications such as carbamazepine. However, effects of kava on intracellular calcium levels have not been directly measured. Intracellular calcium is important for signal propagation, neurotransmission, synaptic function, and plasticity. We have chosen the Retzius neurons of *Hirudo medicinalis*, the medicinal leech, as a model to examine Kava's effects because of their size and accessibility. Our research investigated calcium levels within Retzius cells using confocal fluorescent imaging. Calcium levels before and after kava application were determined by measuring the fluorescence of Oregon Green Bapta 488, a calcium-sensitive fluorescent dye, under confocal scanning with an argon laser. Preliminary results indicate that this approach will be viable for determining the effects of kava on calcium levels. (146)

**Gailey, Ryan\*** and **Lucinda H. Elliott**, Department of Biology, Shippensburg University, Shippensburg, PA 17257; **Judith Bond**, Department of Biochemistry, Hershey College of Medicine, Hershey, PA. *Characterization of MEPRIN Metalloproteinase in Human Kidney and Glioblastoma Cell Lines.* — Meprins are metalloproteinases first discovered in epithelial cells of the intestine and kidney and more recently in various tumor cell lines. Meprins are zinc dependent proteinases that have been implicated in tumor migration and metastasis. The secreted form of Meprin A exists as homooligomeric complexes of non-covalently linked alpha subunit dimers. Oligomerization occurs on the membrane of the ER and is required for the subsequent secretion of the complex. The project at Hershey Medical Center involved characterization of the role of the EGF domain in the oligomerization on the ER membrane of meprin alpha subunits in kidney and epithelial cells. Analysis of several recombinant meprin alpha and beta subunits by SDS-polyacrylamide gel electrophoresis indicate that the a EGF domain causes oligomerization through both intra and inter disulfide bridges. Because of the importance of metalloproteinases in tumor metastasis, this project was expanded at Shippensburg University to characterize Meprin in glioma cells, which are highly invasive brain tumors. (98)

**Gerencher, Joseph J. Jr.\***, Department of Physics and Earth Sciences, Moravian College, Bethlehem, PA 18018; **Michael Sands\***, Essent Corporation, Eason, PA. *Software Developed for Near-Real-Time Internet Seismic Signals.* — A software system, named Seismic Internet Monitoring Application (SIMA), has been developed to allow the near-real-time display and evaluation of seismic traces on the Internet. SIMA consists of three components: an imbedded microsystem (called a TINi) that is connected to as many as four seismometer amplifiers; a network-enabled server that

displays and broadcasts the seismic signals over the Internet; and a client software application that allows for remote display, evaluation, storage/retrieval of the seismic data. Presently, seismic signals are available from two institutions to demonstrate the functionality of the system. All SIMA software components are free and are available for downloading from [www.physics.moravian.edu/seismic](http://www.physics.moravian.edu/seismic). Any person with a computer that runs any version of Windows from 95 through XP can receive near-real-time seismic signals from these sites over the Internet. Institutions with seismometers need only the TINi hardware (cost: approximately \$250) to broadcast their signals over the Internet via SIMA software. (23)

**Gownley, Rosemary T.\***, **Courtney M. Grundmayer**, **Meghan J. Blair** and **Daniel S. Townsend**, Department of Biology, University of Scranton, Scranton, PA 18510. *The Response of Seedlings to Eight Years of Protection from Browsing by White-tailed Deer (Odocoileus virginianus) in a northern hardwood forest.* — White-tailed deer browsing has severely curtailed advance regeneration in many eastern U.S. forests. We sampled seedlings inside and outside each of two 0.7 ha deer exclosures, eight years after construction, at Lacawac Sanctuary in northeastern Pennsylvania. Here, we present results only for seedlings >10 cm tall. Species richness, total abundance (of all species) and species diversity of seedlings were significantly greater inside than outside of both exclosures. Twice as many species occurred inside each exclosure (deciduous forest: 11 inside, 6 outside; coniferous forest: 6 inside, 3 outside) and most species were significantly more abundant inside. Hemlock, chestnut oak, black cherry, and witch hazel were significantly more frequent inside of one or both exclosures. Seedlings of some species were taller, had more branches and more leaves inside exclosures. Deer browsing continues to be a serious threat to regeneration in this northern hardwood forest. (131)

**Grebski, Wieslaw\***, Penn State Hazleton, Hazleton, PA 18201. *Nanofabrication Technology in Engineering Technology Education.* — This paper describes the new opportunities as well as the new challenges which have been created by the introduction of nanofabrication technology. The paper focuses on the impact of nanofabrication technology on various engineering fields. Nanofabrication blends together mechanical, electrical, and chemical engineering into a multidisciplinary task oriented approach. The conventional engineering methods and procedures do not apply on the "nano" scale. The benefit of nanotechnology is miniaturization and very often higher performance and lower cost. (148)

**Griest, Rachel L.\***, **Deanna K. Hutchinson\*** and **Kent K. Fitzgerald**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Anticonvulsant Properties of Piper methysticum Applied to Hirudo medicinalis Retzius Neurons.* — *Piper methysticum*, otherwise known as kava, is

used as a botanically anticonvulsant and anxiolytic. Neurons of the leech, *Hirudo medicinalis*, are an ideal system in which to explore the cellular actions of kava. Single-barreled intracellular recording was used to examine kava's action on the Retzius neurons, which are the two largest cells in the leech ganglia. Because of their size and position within the ganglion, Retzius neurons are easy to identify and access. Membrane potential, action potential amplitude and firing rates were measured before and after extracellular additions of kava. Preliminary results are consistent with our previous findings that kava reduces spontaneous excitability of Retzius neurons, and with results from other systems showing effects of kava similar to those produced by anticonvulsant medications such as carbamazepine. Controls were exposed to equivalent doses of alcohol to determine whether the alcohol solvent in the extract contributes to its effects. (145)

**Guinan, M.C.\* and L. Caslake**, Department of Biology, Lafayette College, Easton, PA 18042. *RFLP Analysis of mer A in Mercury Resistant Organisms Yields New Variants*. — Bacterial mercury resistance is encoded by the mer operon, containing the genes merTPA and up to six additional genes in some operon variants. The merA gene encodes mercuric reductase and is responsible for the detoxification of mercuric ions in resistant bacteria. Although all resistant bacteria have merA, there are sequence variations within the gene that lead to different restriction fragment length polymorphisms (RFLP). NciI RFLP pattern analysis of a gene internal fragment of merA yields eight RFLP patterns. Two unique merA RFLP patterns have been identified in samples taken from mercury-rich Onondaga Lake in Syracuse, New York. These new variants of merA are being sequenced. Sequence analysis of the two novel RFLP patterns will allow the determination of the nucleotide substitutions that give rise to the new patterns. (109)

**Harris, Rachel\* and Robert A. Kurt**, Department of Biology, Lafayette College, Easton, PA 18042. *Investigating the Role of Tumor-Derived KC in Murine Breast Cancer*. — KC is a chemokine that elicits neutrophil migration. We were interested in determining the role of tumor-derived KC, specifically whether the chemokine aided in neutrophil recruitment to a growing tumor, and what role the neutrophils had on tumor growth. For this purpose we transfected a murine breast cancer cell line, 4T1, with a eukaryotic expression vector carrying the anti-sense transcript for KC. It was proposed that blocking KC expression would help delineate its function. However, despite the ability to generate clones that express low levels of KC, we have been unable to generate a stable cell line with reduced KC expression. Previous studies reported that the human homologue of KC, known as Gro, could function as a growth factor for melanoma cells. As a result we are exploring the possibility that KC functions as a necessary growth factor for the murine breast cancer cell line 4T1. (59)

**Havranova, Jana\* and Frank T. Kuserk**, Moravian College, Bethlehem, PA 18018; **Terry Wignot**, Wilkes University, Wilkes-Barre, PA; **Simantini Das and Tibor Sipos**, Digestive Care, Inc., Bethlehem, PA. *Release of Glutathione from an Oral Dosage for the Treatment of Cystic Fibrosis Lung Disease*. — Cystic fibrosis (CF) is due to the deletion of phenylalanine at location 508 on the cystic fibrosis transmembrane conductance (CFTR) protein. As a result of this mutation CFTR cannot fold properly and establish its biological activity of ion-channel gating across cell membranes. Defective ion channeling results in mucus accumulation, persistent bacterial infection, and cell death at the CF lung surface. Direct inhalation of glutathione-reduced (GSH) has been identified as a potential treatment for CF lung disease. Inhalation therapy, however, is time consuming and cumbersome, so a more convenient orally administered form of GSH was tested to determine its release and stability in simulated gastric and intestinal fluids using TLC, enzymatic assays, and iodometric titration. Results indicate that initial GSH release from the matrix was rapid, followed by a more controlled increase. The released GSH was stable under simulated gastric conditions, while it hydrolyzed into amino acids under a simulated intestinal environment after 24 hr at 37°C. (65)

**Hawk, Steven R.\* and Terry L. Master**, Department of Biological Sciences, East Stroudsburg University, East Stroudsburg University, East Stroudsburg, PA 18301. *Habitat Use of Black-throated Green Warblers*. — In the Delaware Water Gap National Recreation Area in northeastern Pennsylvania several species of passerine birds are thought to be dependent on Eastern Hemlock (*Tsuga canadensis*) dominated ravines as a breeding habitat. Hemlock ravines are comprised of a unique combination of species whose habitat is being rapidly altered by infestation with Hemlock Woolly Adelgid (*Adelges tsugae*). Little work has been done investigating the response of these breeding bird species to habitat alteration. This study used Emlen transects to compare breeding bird densities among pristine and infested ravines including surrounding deciduous forest. Part of this comparison dealt with observation of foraging behaviors. Results indicate that breeding bird densities were not correlated with degree of infestation but more with ravine extent and forest structure. Black-throated green warblers were found to feed almost exclusively in hemlock ravines compared to the adjacent hardwood forest. (166)

**Hayes, Justin A.\* and Carol Bair**, Department of Biological Sciences, York College of Pennsylvania, York, PA 17405. *Factors Affecting E. coli Growth in Limed versus Anaerobically Digested Sludge*. — It has been demonstrated that pathogens such as *Salmonella* or *E. coli* can grow in biosolids, especially when inoculated by animals (Sidhu 1999, 2001). The objective of this study was to compare factors affecting bacterial growth. The pH of the limed samples was found to be significantly higher (p=0.03) than

anaerobically digested samples. No significant differences were found between limed and anaerobically digested samples for indigenous populations. *E. coli* grew well in anaerobically digested, sterilized samples over six-hours, but growth in limed samples was minimal. Since pre-limed, sterilized control samples allowed extensive growth of *E. coli*, it is likely that high pH was the main factor affecting *E. coli* growth in these types of biosolids, although nutrient and heavy metal content should also be investigated. These preliminary results suggest *E. coli* could grow to higher levels in anaerobically digested compared to limed biosolids, which may raise some safety concerns. (138)

**Herman, Kathryn E.\* and David S. Richard**, Department of Biology, Susquehanna University, Selinsgrove, Pennsylvania 17870. *Microarray Analysis of Gene Expression in Drosophila melanogaster Ovaries Following Treatment with Juvenile Hormone or Ecdysteroids*. — As part of an ongoing investigation into endocrine control of vitellogenesis in *Drosophila melanogaster*, the roles of Juvenile Hormone (JH) and ecdysteroids in gene expression are being studied by microarray analysis using Affymetrix EST *Drosophila* chips. Females with the JH-deficient apterous56f (ap56f) mutation were treated with either 1 mg JH III in 1 ml acetone (shown previously to rescue the delay in the onset of vitellogenesis) or 1 ml acetone (control) 6 hours post-eclosion and their ovaries harvested 18 hours post-eclosion for mRNA extraction. Similarly mRNA extracted from ovaries of diapausing wild-type females (which are deficient in ecdysteroids) 48h after injection with 11ng 20-hydroxyecdysone in 23ml MEM (shown previously to terminate diapause), or MEM controls, was subject to microarray analysis. Changes in gene expression were noted in the diapause/ecdyteroid investigation such that between 200 and 300 genes were up-regulated and 200 were down-regulated. Similar results are anticipated for the ap56f/JH investigation. In a related investigation, yolk protein levels in ovaries from ap56f flies treated with either JH or acetone 6 hours post-eclosion were determined by immunological means during the 24h after treatment. Preliminary results suggest that JH increases YP uptake by receptor-mediated endocytosis. Supported in part by NIH grant #GM/OD54905 to DSR. (18)

**Hess, Nicholas\* and Lucinda H. Elliott**, Department of Biology, Shippensburg University, Shippensburg, PA 17257; **Nicole Gantt**, Department of Biology, Shepherd College, Shepherdstown, WV. *Engineering of an Expression Vector Containing a Cloned cDNA Encoding Human Liver Calpastatin*. — Calpastatin is a ubiquitously expressed protein that is the only known intrinsic inhibitor of calpain, a protease associated with integrin related signaling and tumor migration. A cDNA encoding human calpastatin was recently cloned from a human liver cDNA library. In this project, molecular biology techniques were used to insert the calpastatin cDNA clone into the ApaI/BamHI sites of the pcDNA3.1 hygro (+) expression vector for transfection into

glioma cell lines. Because gliomas are highly aggressive and invasive tumors, patients rarely survive past one year after diagnosis due to the establishment of secondary tumor sites in the brain. The engineering of the calpastatin expression vector will contribute to functional studies at the University of Kentucky School of Medicine to determine the effect of the overexpression of calpastatin in gliomas on calpain mediated tumor migration. These studies could result in more effective treatment protocols for patients harboring glioblastomas. (110)

**Hoffman, Marcus K.\* and Diane M. Bridge**, Department of Biology, Elizabethtown College, Elizabethtown, PA 17022; **Daniel E. Martinez**, Pomona College, Claremont, CA. *Using Reagents Affecting the Phosphoinositide Cycle to Investigate Development of the Cnidarian Podocoryna carnea*. — Cnidarians are morphologically simple invertebrates which have long been subjects of developmental research. The phosphoinositide cycle has been implicated in correct placement of structures along the oral-aboral body axis in the genus *Hydra*. To determine whether this is characteristic of cnidarians, we are investigating the role of the phosphoinositide cycle in the cnidarian *Podocoryna carnea*. The adult stage of *P. carnea* is a swimming medusa, considerably different from the sessile polyp *Hydra*. Developing *P. carnea* medusae were incubated in valproic acid, which causes inositol depletion. In *Hydra*, valproic acid causes tissue to form structures appropriate for a location closer to the aboral end of the body. We find that this is also the case in *P. carnea*; treatment with valproic acid causes reduction of structures of the oral end. To gain further evidence that this effect involves inositol depletion, we are determining whether it can be reversed by inositol addition. (52)

**Holmes, Sandra A.\* and Sara Brown**, Messiah College, Grantham, PA 17027. *Identifying the Bolivian Iturralde Feature as a Complex Soft Sediment Impact Crater*. — We propose the Iturralde feature be the first identified soft sediment impact crater in Bolivia. Located in the Amazon River Basin, its anomalous morphology was first noticed in NASA Landsat satellite images. There is an apparent similarity in shape of the structure to complex craters of known meteorite origin. Craters formed by cosmic impacts can be detected either by their shape, occurrences of strongly deformed rock, and/or conspicuous geophysical anomalies. The verification of a soft alluvium impact is based on the geology and morphology of the crater, and the connection between the crater and signature evidence. We suggest this crater represents a rare example of a well-preserved, young, complex impact crater formed in soft sediment, alluvium deposits. A search for meteoric material is being conducted at present to provide unequivocal evidence for an impact origin of the Iturralde feature. (22)

**Hopper, Jessica J.\* and Thomas E. Murray**, Department of Biology, Elizabethtown College, Elizabethtown, PA

17022. *Non-point Source Nutrient Management in a Small Lake*. — Lake Placida is a eutrophic lake on the campus of Elizabethtown College. The lake had historically experienced high non-point source nutrient loading from waterfowl and the surrounding campus. In the summer of 2002, a restoration project resulted in the installation of upstream wetlands, stream buffers, as well as newly planted macrophytes in the littoral zone. Six sampling sites were established throughout the mitigation system, extending from above the planted areas to the outlet of the lake itself. Samples were collected monthly from January to August, then biweekly from September through November and analyzed for phosphate, nitrate, and ammonium. It was expected that nutrient concentrations would decrease along that gradient once the vegetation became established. Phosphate and ammonium concentrations were lower than historical high values, but showed no significant decrease from upstream to downstream. Nitrate concentrations did decline throughout the system, suggesting either denitrification and/or assimilation by the new plantings. (177)

**House, Christopher M.\*, Sarah M. Klinge and Richard Schauer**, Department of Biology, Gannon University, Erie, PA 16541. *The Effects of Estrogen on Glucose Cotransport Within the Small Intestine of Ovariectomized Female Rats*. — This experiment examined the effects of estrogen upon glucose cotransport in the small intestine of ovariectomized female rats. Ovariectomized, control rats were injected with either 0.9% NaCl or with 5micrograms 17-beta Estradiol. Experiments were run for 6, 12, and 24 hour treatment periods. Following decapitation, a duodeno-jejunal portion of the small intestine was extracted. After everting and filling the intestinal portion with choline chloride solution, the segments were incubated at 37°C for 45 minutes in a muscle warmer filled with 1% glucose. Data was collected using both a hexokinase glucose assay and BCA protein assay to determine estrogen's effect on glucose cotransport. Phloridzin, which specifically inhibits glucose transporters, was demonstrated to block estrogen's effect on glucose cotransport. Intestinal segments from ovariectomized rats treated with 17-beta Estradiol demonstrated an increase in glucose cotransport as compared to the controls. (144)

**Jesic, Slaven\* and Todd M. Hurd**, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Relative Contributions of Fish Hatchery Carbon to Spring Creek Sediments and Pollution Tolerant Isopods*. — Some limestone spring creeks in Pennsylvania have been impaired from nutrient and organic inputs, indicated by pollution tolerant isopods (*Lirceus*) and sedimentation. We determined the contribution of hatchery carbon to sediments and to *Lirceus* in Big Spring, an ecosystem that formerly received hatchery effluent, and to similar streams with hatcheries. Using stable <sup>13</sup>C as a tracer, we determined that 75% of carbon in Big Spring sediments following hatchery closure was hatchery derived. The diet of *Lirceus* in upper Big Spring

was 71% hatchery material one month following closure (Dec. 2001), and 40% in July 2002. Further downstream *Lirceus* was depending more on plant carbon or agricultural waste. Preliminary results suggest that *Lirceus* in Green Spring, a similar ecosystem with a private hatchery at its source, is relying on agricultural or plant carbon, whereas hatchery waste contributes 60% to *Lirceus* carbon downstream of a state hatchery on the Yellow Breeches. (157)

**Jewett-Smith, Jerilyn\*, Elaine Moyer and Kerri Koch**, Department of Biology, East Stroudsburg University, East Stroudsburg, PA 18301. *Macroalgae of Southern Chincoteague Bay Shallow Water Ecosystems*. — To date, 31 species of macroalgae have been identified from 14 southern Chincoteague Bay sites in the following taxa: 11 Chlorophyta, 16 Rhodophyta and 4 Phaeophyta. Sites included sandy bottom with polychaete tubes for attachment, *Zostera marina* beds, shell-hash and rocky rip-rap. Species were vouchered as dried specimens, preserved in 4% formalin in seawater and photographed in situ, macroscopically and microscopically (whole mount and cross section). The most common algae encountered were *Gracilaria tikvahiae*, *Agardhiella subulata*, *Porphyra rosengurtii*, *Codium fragile* subspecies *tomentosoides* and *Fucus vesiculosus*. (77)

**Karzenowski, Dawn\*, Christina Antolino\* and K. Joy Karnas**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Characterization and Visualization of the Involvement of the Secretory Pathway in Lipoprotein Biosynthesis*. — Cardiovascular disease is caused by the accumulation of cholesterol in one's arterial walls. Lipoproteins are of particular interest because they facilitate the intracellular transport of cholesterol in multicellular organisms. In this study, lipoprotein biosynthesis has been characterized by expressing *Manduca sexta* apolipoprotein in both *Saccharomyces cerevisiae* and *S2 Drosophila* cells. Previous studies have demonstrated that *M. sexta* apolipoproteins can be expressed, lipidated, and secreted in both systems. However, the mechanism of lipidation is not completely understood, allowing for further investigation. Unicellular organisms can secrete lipoproteins even though they have no biological need for the particle as it functions in intracellular transport. Using yeast secretory mutants, the requirement for the secretory pathway in the synthesis of lipoproteins was investigated. To localize lipoproteins during their processing through the secretory pathway, apolipoprotein was tagged with GFP and expressed in both systems. These experiments examine lipoprotein biosynthesis and further characterize their role in intracellular transport. (104)

**Kettering, R. D.\*, S. E. Williams and A. F. Wolfe**, Department of Biology, Lebanon Valley College, Annville, PA 17003. *Comparative Morphology of Plumbago auriculata and Plumbago indica Sepals*. — Light and electron microscopy revealed similarities between the tall trichomes

on the outer sepal surface of *Plumbago auriculata* and *Plumbago indica* and those found in carnivorous plants related to *Drosera*. In *P. indica* about 25% of these are half as long as the tall trichomes. Sessile glands also occur on the inner surface of *P. indica*. *P. auriculata* has single-celled hairs on the outer surface. The trichomes have 3-4 layers of gland cells separated from the stalk by an endodermis. The stalks have an epidermis surrounding 2-3 layers of parenchyma and a central tissue, which is vascular in *P. auriculata* but not in *P. indica*. DNA phylogenies have shown *Plumbago* to be related to the Droseraceae. The stalked glands of *Plumbago* have structures, which may be homologous to parallel structures in the *Drosera* tentacle. (132)

**Kiefer, Christopher, S.\*, Christopher Magel\*, Laura A. Pell\* and Janet Wright**, Department of Biology, Dickinson College, Carlisle, PA 17013; **John D. Peles**, Department of Biology, Pennsylvania State University-McKeesport, McKeesport, PA 15132. *Spatial and Seasonal Den use in Allegheny Woodrats (Neotoma magister) in South-central Pennsylvania*. — The Allegheny woodrat, once common in Pennsylvania, has recently undergone a rapid decline. Efforts to determine the cause of decline have been hampered by a lack of baseline data on habitat use. We located dens of 29 radio-collared woodrats (15 females and 14 males) at four sites along mountain ridges in Perry-Dauphin Counties, Pennsylvania, and tracked 18 of them 3x/week up to 24 weeks. Habitat within 25m of den site was scored for quality of rock shelter. A total of 47 den sites and 26 refuges (used ≥2days) were mapped. Females occupied the highest-quality den sites; males occupied lower quality sites but moved into high quality central dens when females were not present. Woodrats of both sexes shifted dens from time to time during the summer, but none shifted dens after mid-September. The results suggest that establishing a quality den site in summer is a high priority for woodrats and should be a focal point in determining reasons for the species' decline. (170)

**Kiemle, Sarah\* and Jack Holt**, Department of Biology, Susquehanna University, Selinsgrove, PA 17870. *Islands in the Stream: Island Biogeography and Diatoms in Penns Creek, Snyder County, Pennsylvania*. — We examined the distribution of diatoms on rocks in the lower reach of Penns Creek, north of Selinsgrove, Snyder County, Pennsylvania through the fall of 2002. This investigation studied the relationship between substrate surface area and the number of diatom species present. Diatom scrapings were taken from rocks of different sizes, which consisted mostly of Montebello Sandstone. The diatoms were cleaned, prepared and viewed with electron and light microscopy. For this investigation we deliberately chose rocks with upper surfaces that were flat and approximately square, characteristic shapes for rocks of the Montebello Sandstone. We examined diatom species occurrence (5 to 24 species) on stones rang-

ing 0.5 to > 180 cm<sup>2</sup>. We found a strong relationship between area and the number of diatom species ( $R^2 > .85$ ). Our data suggest that rocks in the creek can be viewed as islands when considering diatom occurrence and diversity. In addition, they illustrate that the principles of Island Biogeography can be applied to organisms on the scale of diatoms. (40)

**Kinne, Jennifer\* and Jeffrey D. Newman**, Department of Biology, Lycoming College, Williamsport, PA 17701. *Expression of Staphylococcus aureus pur Q in E. coli*. — The purine biosynthetic pathway's fourth step is catalyzed by the enzyme formylglycinamide ribonucleotide amidotransferase (FGARAT) and is composed of multiple subunits in most bacteria. One subunit is encoded by *Staphylococcus aureus* gene purQ, which was cloned into a pET vector and transformed into *E. coli*. Expression of this protein T7/lac promoter system was induced using isopropylthio-B-D-galactoside (IPTG). The protein was extracted from cells, separated into soluble and insoluble fractions and analyzed by SDS-PAGE. The protein was abundant and present in the soluble fraction. Efforts now are focused on purification of the protein by affinity chromatography using Nickel-coated agarose. (60)

**Koch, K.\*, E. Moyer and J. Jewett-Smith**, Department of Biology, East Stroudsburg University, East Stroudsburg, PA 18301. *Identification and Quantification of Macroepiphytes of the Invasive Marine Alga, Codium fragile subs. Tomentosoides*. — Macroepiphyte loads of the marine alga *Codium fragile* subs. *tomentosoides* were studied to quantitatively identify and document distribution patterns of the species within Chincoteague Bay, Virginia. High abundances of *C. fragile* subs. *tomentosoides* are indicative of nutrient loading occurring within a bay. Three field studies were done in spring and summer 2002, at four sites within Southern Chincoteague Bay, VA. On-site water testing results showed 33–38ppt salinity, ~6.6mg/l dissolved oxygen, 0–0.03 mg/l nitrogen, and 0.28 mg/l phosphorus. Collected algal specimens were preserved in a 4% formalin/35ppt seawater solution. Two dominant epiflora occur on *C. fragile* subs. *tomentosoides*; *Ceramium rubrum*, and *Polysiphonia harveyi* were found at 0–5% coverage. Distribution studies of *C. fragile* subs. *tomentosoides* and its epiflora will contribute to baseline studies and provide a foundation for tracking changes in the health of the bay ecosystem. (171)

**Koenig, Kristen\* and Bruce A. Young**, Department of Biology, Lafayette College, Easton, PA, 18042; **Kate Jackson**, Museum of Comparative Zoology, Harvard University, Cambridge, MA. *Muscular Specializations for Venom Expulsion in Pitvipers*. — Venom ejection in snakes is driven by contraction of skeletal muscles located adjacent to, or attaching on, the venom gland, but the respective contributions of these muscles remains unknown. This is particularly true in the pitvipers or Crotalidae. Within these snakes

one of the muscles adjacent to the venom gland, the M. Pterygoideus, may give rise to a smaller partially isolated component, the M. Pterygoideus glandulae (Pg), which attaches directly onto the surface of the venom gland. To explore the functional role of this muscle we tested venom expulsion in three pitvipers: copperheads (*Agkistrodon contortrix*) in which the Pg is absent, western diamondback rattlesnakes (*Crotalus atrox*) in which the Pg is weakly developed, and Malayan pit vipers (*Calloselasma rhodostema*) in which the Pg is robust. The musculature surrounding the venom gland was stimulated electrically, concurrent with recordings of venom pressure. Statistical analyses revealed that the Pg does enhance venom expulsion. (70)

**Kory, William B.\***, Department of Geography, University of Pittsburgh at Johnstown, Johnstown, PA 15904. *Pennsylvania's Cities — Growth and Decline: 1990 to 2000*. — The presentation will focus on the cities in Pennsylvania and examine the geodemographic variables influencing the growth or decline of population in these cities. Sixteen of the top twenty most populous cities in the Commonwealth had net losses in population, with Chester leading the group with a 12% decline. Of the four cities experiencing a net gain in population, Reading was the highest with a 4% increase. Since Pennsylvania had only a 3.4% population increase between 1990 and 2000 and most of its large cities had net losses in population, the increase was occurring in the smaller cities and towns. The population losses in the urban centers have many implications for the Commonwealth. Some of these will be analyzed and discussed. (25)

**Koziar, Sheryl\***, **Amy Busom** and **Richard L. Stewart Jr.**, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Surveillance for Viral Antibodies in Eastern Coyotes (Canis latrans)*. — Eastern coyotes may serve as reservoirs for Canine Distemper Virus (CDV) and Canine Parvovirus (CPV), potentially passing agents to our domestic canines. CDV is highly contagious; effecting mostly young and immunosuppressed canines. The virus is unstable in the environment, so the main route of transmission is through close contact with contaminated aerosols. CPV is very stable in the environment, consequently the main route of transmission is through direct contact or contact with contaminated feces. Currently there are no published studies concerning the reservoir potential of Eastern coyotes for these viruses. We collected blood samples and tested the serum using a Microwell ELISA Assay Kit. This exhibited positive, the coyote has or has had the disease, and negative results. Our study, thus far, reveals that 1:14 or 7% of the Eastern coyote population tested positive for CDV antibodies and 8:14 or 57%, tested positive for CPV antibodies. Our results are a significant finding towards understanding the epizootiology of these viral diseases. We believe that CPV is more prevalent because of its increased environmental tolerance. (83)

**Krepps, Desarae\*** and **Lauren Yaich**, Department of Biology, University of Pittsburgh at Bradford, Bradford, PA 16701. *Drosophila Neural Development Mutants Homothorax and l(3)06442: A Phenotypic Analysis*. — The development of the peripheral nervous system in *Drosophila melanogaster* is controlled by a complex interplay of genetic interactions. Two genes believed to be involved in *Drosophila neurogenesis*, homothorax and l(3)06442, are the focus of this study. Embryos that had mutations in these genes were phenotypically characterized using the antibodies 22C10 and (-cut, which stain neurons. Our preliminary analysis indicates the existence of neuronal deletions and rearrangements in these mutant embryos. A molecular analysis of these genes is also in progress. (114)

**Kretzer, Paul, Jessica Ellerman\*** and **Thomas Brennan**, Department of Biology, Dickinson College, Carlisle, PA 17013. *Purification and Characterization of cis and trans Photoisomers of Intermediates of the Phenylpropanoid Pathway in Higher Plants*. — Ultraviolet-B radiation (UVB, 280-320 nanometers) interferes with normal plant growth through a variety of mechanisms, and different species have evolved various methods of coping with this form of environmental stress. One defensive response induced by UVB exposure is the synthesis of UVB-screening flavonoid compounds via the phenylpropanoid pathway. Several intermediates of this pathway undergo trans to cis photoisomerization upon exposure to UVB radiation. Purification of the isomers in reasonably large quantity is necessary in order to study their chemical and biological properties. The purity of cis and trans preparations of cinnamic, p-coumaric, caffeic, ferulic, and sinapinic acids has been demonstrated by HPLC, and large-scale (milligram) separation has been achieved using paper chromatography. Work is now underway to characterize these compounds in terms of their Rf values, absorption spectra, and extinction coefficients, and to study possible biological functions of the different isomeric forms. (135)

**Krupa, Kathryn E.\***, Department of Biology, Mercyhurst College, Erie, PA 16546. *Analysis of Plankton Communities in Quarry Ponds of Northwest Pennsylvania*. — Lake Pleasant is a glacially formed lake in Erie County, PA that has a series of man-made ponds located on the west side of its watershed. While the Western PA Conservancy has collected much data on the physical and chemical properties of the ponds, there is no information available on the plankton communities present. I hypothesized that the ponds would show some degree of similarity in the plankton composition due to their close proximity and similar origins (gravel quarry operations). The ponds and the lake were sampled for plankton concurrently in the fall of 2002 with an 80 µ mesh plankton net. *Ceratium hirundinella* and copepod nauplii were the dominant plankton found in many of the ponds. A diverse assemblage of plankters was found collectively in these small systems. There was, therefore, less similarity

among the plankton communities of the ponds than I expected. (123)

**Lamendella, Regina\***, Department of Biology, Lafayette College, Easton, PA 18042; **Meghan Rothenberger**, North Carolina State University, Raleigh, NC; **Lorraine Mineo**, Lafayette College, Easton, PA 18042. *Tributary Water Quality in Drought and Drought Alleviation*. — Because prior studies revealed spring waters feeding the Bushkill Creek carry twice the load of nitrate and phosphate as the mainstream (Terrigno et al., 1995; Milunec et al., 1996; Adler et al., 1997), two tributaries of the Bushkill were chosen to monitor seasonal changes in water quality (Rothenberger and Mineo, 2002) for which drought conditions persisted [fall–winter, 2001] and drought recovery conditions existed [fall–winter, 2002]. Five sampling stations along each tributary as well as corresponding stream water were sampled. Water temperature, dissolved oxygen, pH, and light intensity were measured at each station. Samples were tested for nitrate, phosphate, aluminum, and sulfate. The present study shows higher nitrate levels under drought alleviation conditions [2002] compared with drought conditions [2001] (Rothenberger and Mineo, 2002). (174)

**Lanns, Marhja L.O., Heather A. Messner, Timothy S. Pelc** and **Thomas C. Peeler**, Department of Biology, Susquehanna University, Selinsgrove, PA 17870. *The Role of β8 integrin in the Interaction between Schwann Cells and Extracellular Matrix*. — Schwann cells and peripheral nerve axons interact intimately during the development of the nervous system. During embryonic development, Schwann cells produce an ECM that contains an unusual isoform of collagen type V (p200) not found in mature nerve ECM. This early form of ECM may be important for proper migration and positioning of Schwann cells and nerve axons. Other studies led us to hypothesize that the β8 integrin subunit is responsible for Schwann cell interaction with p200-containing ECM. In order to test this hypothesis, we have created a DNA construct that results in the synthesis of a chimeric protein that functions as a dominant negative for β8 integrin. The chimeric protein has the β8 integrin cytoskeletal domain, and the extracellular and transmembrane domains of the erythropoietin receptor. We plan to transfect the β8 constructs into Schwann cells, and follow their response to growth on p200 ECM to determine if the β8 integrin subunit is responsible for Schwann cell interaction with p200. (97)

**Leptuck, Tiffany\***, **Valerie Breznak, Fritz Delva, Eric Eutsler, Douglas Frederick, Jason Hoch, Eric Luther, Amy McEuen, Deana Mikhalkova, Michael Steele, Debra Stillman, Nadia Terzaghi** and **William Terzaghi**, Department of Biology, Wilkes University, Wilkes-Barre, PA 18766; **John Carlson, Holly Marking** and **Richard Meisel**, School of Forest Resources, Pennsylvania State University, University Park, PA 16802; **Peter Smallwood**,

University of Richmond, Richmond, VA. *Determining Relationships between Oak Seedlings and Adult Trees in Native Forests by DNA Fingerprinting*. — We hypothesized that seedlings from red oak species should be widely dispersed whereas white oak seedlings should be clumped near the parent tree because squirrels cache red oak acorns more frequently than white oak acorns. To test this hypothesis we have used DNA fingerprinting. We have extracted DNA from 1576 seedlings and 1290 adult trees at 4 sites: 2 in PA, and one each in MD and IN. We have identified ten primer pairs that amplify polymorphic STRs in *Quercus alba*, *Q. prinus*, *Q. velutina* and *Q. rubra*. At the first site the red oak group is substantially more genetically diverse than the white group. We have successfully matched more than 25 red oak seedlings to at least one of their parent trees, whereas we have only matched a few white oak seedlings. When this pedigree analysis is completed we will be able to directly measure dispersal distances between adult trees and their seedling offspring, and to measure the genetic structure of these oak forests. (117)

**Librandi, Tracey M.\*** and **Timothy J. Maret**, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Habitat Selection by Spotted Turtles (Clemmys guttata) in a Heavily Managed Area of Michaux State Forest, Pennsylvania*. — Six spotted turtles (*Clemmys guttata*) were tracked using radio telemetry during the summer of 2002, in a heavily managed area of the Michaux forest in Pennsylvania. These spotted turtles were found in and around temporary ponds that fill with water in the fall and dry out in mid to late summer. A total of seven different temporary ponds were utilized. Some turtles remained faithful to only one or two ponds, while others visited several ponds throughout the study period. Spotted turtles were also found traveling between ponds on several occasions. During late summer, turtles moved onto land to aestivate. Aestivating turtles were found most frequently in previously clear-cut areas and were rarely found in uncut areas. At the end of the study period, all six turtle returned to a single pond to hibernate. This information is valuable in assessing habitat requirements of spotted turtles so that their habitats can better be managed. (162)

**Lindsay, Brianna\***, **Michael Klingler\*** and **James Sidie**, Department of Biology, Ursinus College, Collegeville, PA 19426. *Effect of pH on the Anesthetic Action of Alkyl Alcohols*. — We have investigated the anesthetic effect of alkyl alcohols (C8 - octanol to C11 - undecanol) at low concentrations (10-5M - 10-4M). These alcohols can be shown to inhibit CNS neurons in the medullary pacemaker nucleus of weakly electric fish. This neural network which drives the electric organ discharge (EOD) in these fish exhibits great temporal stability (+/- 1µsec.). Decrements in EOD frequency (EODf) provide reliable quantitative data regarding the pharmacokinetic properties of these neurally active compounds. Recent investigations have examined the role that

serum proteins might play in this process. As part of this study, we examined the possible effect of pH on anesthetic action. Decanol at 5x10-5M in the bathing solution produces an EODf decrement of 24% at pH 6.0; at pH 7.0 the EODf change is 22%; at pH 8.0 the EODf reduction is 19%; at pH 9.0 the EODf decrement is 16%. Since these alcohols are unlikely to bear charges at any of these pHs, the explanation for this effect must be sought elsewhere. We propose that the site of action is endogenous serum albumin, and that as the pH changes, the albumin's ability to bind alcohol increases as pH increases. Supported in part by HHMI/Ursinus Research Grant. (90)

**Lucent, Del\*, Yueh-Ju Hsiao and William Terzaghi**, Department of Biology, Wilkes University, Wilkes-Barre, PA 18766. *Measuring Respiration in Arabidopsis Fatty Acid Mutants*. — Fatty acid composition is proposed to affect the fluidity and melting temperature of biological membranes. Membrane fatty acid composition may therefore affect many physiological processes such as photosynthesis and respiration. We are testing the hypothesis that changes in fatty acid composition will affect respiration using Arabidopsis mutants with elevated levels of saturated fatty acids due to defects in unsaturation. To obtain enough material to isolate useful amounts of mitochondria we are preparing root and cell cultures of the mutants fad2-2, fab-1 and ssi-2. We are presently studying the temperature dependence of respiration in intact cultured cells, and learning to extract mitochondria from these cells. We intend to determine the lipid composition and temperature dependence of respiration in mitochondria isolated from these cells. These data will provide useful information on the relationship between fatty acid composition and respiration. (101)

**Luckenbaugh, Jessica M.\* and Marilyn Daly**, Department of Biology, York College of Pennsylvania, York, PA 17405. *Evaluation and Performance of Selected Tender Perennials Grown in a 2002 Plant Trial*. — Tender perennials, plants that are hardy perennials in their warmer native habitats, may be grown as summer annuals in Pennsylvania's USDA Zone 6, where they are not normally hardy. However, they must perform well in this region's summer conditions and reach their horticultural potential within one growing season when grown from seeds or cuttings. This study evaluated 47 tender perennials to determine which had horticultural potential as annuals in USDA Zone 6. Evaluations occurred from July 2 to September 22, 2002 using seven horticultural criteria (plant vigor, resistance to disease, pests and predation, uniformity of size, flower appearance, bloom percentage, uniformity of bloom, and foliage appearance) and six bonus criteria (fragrance, uniqueness, architecture, attraction of wildlife, and self-cleaning blooms). The top performers were *Lantana camara* 'Patriot Petticoat,' *Lantana montevidensis*, and *Cuphea hyssopifolia*. Opening the trial to public observation exposed gardeners to exceptional, and in some cases unknown, tender perennials. (128)

**Lunnen, Shane\*, Carolyn Itle\* and Edward P. Levri**, Div. of Math and Science, Penn State - Altoona, Altoona, PA 16601. *The Effect of a Trematode Parasite on the Behavior of a New Zealand Snail in Lake Peorua, New Zealand*. — Parasites often influence the behavior of their hosts in ways that are beneficial to the parasite. Here we examined the behavior of the New Zealand snail *Potamopyrgus antipodarium* infected with the trematode, *Microphallus* sp. in Lake Peorua in New Zealand. *Microphallus* requires infected snails to be ingested by waterfowl in order for transmission to occur. Snails were sampled from the tops of vegetation and from the substrate at different times of the day. Snails at the tops of vegetation are assumed to be at a greater risk of predation than those buried in the substrate. Time of day, snail gender, brooding condition, and parasite infection were all found to affect the position of the snail. Behavior patterns were found to differ from other lakes that have been sampled. The behavior pattern exhibited by infected snails may be advantageous for the parasite. (125)

**Lutton, Lewis M.\***, Department of Biology, Mercyhurst College, Erie, PA 16546. *The Evolution of Love and Other Social Emotions*. — A central claim of sociobiology is that there is a genetic basis for our social behaviors; in particular, those that lead to altruistic acts on behalf of others. It is argued in this paper that the biological underpinnings for this claim include the idea that feelings such as love, compassion and guilt are critical to such behavior and that these feelings have a genetic basis in us and other social animals, at least in other social mammals. The central question asked here is how these feelings could have evolved in social mammals. It is hypothesized that the most likely, testable source for these feelings and their impact on our behavior are the innate neural mechanisms that induces the feelings and behaviors associated with parental care in more primitive mammals. From where these feelings may have arisen and how genes can lead to such feelings will be briefly addressed. (68)

**Maret, Timothy J.\***, Department of Biology, Shippensburg University, Shippensburg, PA 17257; **Jonathan Snyder**, United States Fish and Wildlife Service, Carlsbad, CA 92008. *The Effect of Pond Hydroperiod on the Distribution of Native Salamanders and Introduced Predators in Arid Lands*. — In Arizona's San Rafael Valley, cattle ponds designed to hold water year-round have replaced seasonal marshes, and this altered drying regime has facilitated invasion by disturbance-intolerant fish and bullfrogs that negatively affect native Sonoran tiger salamanders. We investigated the relationships among pond drying regime, presence of introduced fish and bullfrogs, and presence of tiger salamander populations. Both fish and breeding bullfrog populations disappeared following pond drying. Pond drying in SRV cattle ponds negatively affected salamanders, but only when it lasted through the breeding season. Metamorphosed bullfrogs ate salamander larvae in laboratory and field

experiments, and persistence of salamander populations was negatively correlated with introduced fish. Once fish eliminated salamanders from an aquatic habitat, salamanders seldom reappeared unless fish were killed by drying. Simple models we developed show that further reducing pond drying frequency could negatively affect salamanders by leading to a community dominated by disturbance-intolerant fish and bullfrogs, but further increases in drying could negatively affect salamander populations by preventing salamander breeding. (86)

**Martin, Ashley J. and Eric P. Ingersoll\***, Department of Biology, Penn State Abington, Abington, PA 19001; **Lance Lacoff and Elaine R. Reynolds**, Lafayette College, Easton, PA 18042. *Aminopeptidase N Activity is Reduced in Drosophila Slamdance Mutants*. — A class of *Drosophila melanogaster* mutants shows a unique sensitivity to strong physical stimulus. These so-called "bang sensitive" mutants paralyze when exposed to a mechanical shock. Recently the gene for one of these bang sensitive mutations, called slamdance, has been cloned. Sequence analysis has revealed that the slamdance gene encodes for the enzyme aminopeptidase N. We have undertaken an analysis of the expression of aminopeptidase N enzymatic activity in slamdance mutant flies. We have found a significant reduction in aminopeptidase N activity in slamdance mutant adult flies. We will present these data as well as data on the expression of aminopeptidase N activity throughout the development of both wild type and mutant fruit flies. (108)

**McAnallen, Erin L.\***, Department of Biological Sciences, York College of Pennsylvania, York, Pa, 17405. *Prokaryotic Production of Human Interleukin 13 Receptor Alpha 2, a Cancer-Associated Antigen*. — A new approach to cancer treatment is the ability to kill cancer cells while avoiding healthy tissue. A requirement for this strategy is the presence of a molecule found uniquely on the cancer cell and absent on normal cells. Once identified, cells expressing this cancer-associated molecule can be specifically targeted for treatment. A cytokine receptor protein, human interleukin 13 receptor alpha 2 (hIL13Ralpha2), is a cancer-associated protein. Relying on the specific interaction between antibody and antigen, antibodies to hIL13Ralpha2, modified with cytotoxic agents, may seek out and destroy cancer cells over-expressing hIL13Ralpha2 on their surface. To generate an anti-cancer antibody, a significant amount of antigen, the hIL13Ralpha2 protein, was required. We produced and purified a recombinant extracellular portion of hIL13Ralpha2 protein using a prokaryotic expression system. The purified recombinant protein will be used as antigen to generate the anti-cancer (anti-hIL13Ralpha2) antibodies. (103)

**McKinney, Crystal \*, Kimberly Hengst, Holly D. Bendorf and Michelle A. Briggs**, Department of Biology, Lycoming College, Williamsport, PA 17701. *Chemical Differences between Preferred and Unpreferred Goldenrod*

(*Solidago altissima*) Clones and the Link to Gall Fly (*Eurosta solidaginis*) galling behavior. — Based on previous *Eurosta solidaginis* ovipositional choice tests and *Solidago terpenoid* composition, we hypothesized chemical differences between preferred and unpreferred *S. altissima* (tall goldenrod) clones may influence *Eurosta* ovipositional choice. We conducted behavioral tests using preferred and unpreferred clonal extracts alone, or enhanced the extracts with a terpenoid. Statistical analysis revealed that adding caryophyllene oxide, s-(-) limonene, eugenol and cis-3-hexen-1-ol had no significant effect on fly ovipositional behavior. However, adding D-camphor, limonene oxide, P-cymene and camphene all deterred flies from both preferred and unpreferred clones. Terpenoid extraction from clones and identification was performed with GC/MS. Our most preferred clone contained higher amounts of beta-pinene, previously found to be an attractant, while our most deterrent clone contained relatively more alpha-humulene (a deterrent). (151)

**Mellert, Hestia\*, Derese Getnet, Ella Lazo, Brett Scipioni, Michelle Hornbaker and Rebecca A. Roberts**, Department of Biology, Ursinus College, Collegeville, PA 19426. *Estrogen and Estronegenic Endocrine-disrupting Chemicals affect Protein Expression in Immune Cells*. — The relationship between the endocrine and immune systems is not fully understood. The discovery of estrogen receptors (ER) on lymphocytes and antigen presenting cells (APCs) has sparked a growing interest in the role of estrogen (E2) in cell-mediated immunity. Bisphenol-A (BPA), an EEDC, is used as a monomer in polycarbonate plastic production. We investigated the effect of estrogen and the estrogenic endocrine-disrupting chemical BPA on protein expression in immune cells. Splenocytes from three strains of mice and a murine dendritic cell line were exposed to BPA and E2 in culture. Protein expression in treated samples was altered compared to controls. (141)

**Merdinger, Melissa\*, Natalie Moulton\* and Carol Loeffler**, Department of Biology, Dickinson College, Carlisle, PA 17013. *Patterns of Woody Regeneration and Microste-gium Invasion in a Ten-year Deer Exclosure Experiment in South-central Pennsylvania*. — We studied impacts of a high white-tailed deer (*Odocoileus virginianus*) population on understory vegetation by comparing nine ten-year-old fenced plots and adjacent control plots grouped in three different habitats at the Florence Jones Reineman Wildlife Sanctuary in Perry Co., PA. In two sparsely wooded areas, shrubs and tree saplings increased dramatically in number, percent cover and height in fenced plots, relative to those in control plots. A layer of *Rubus*, which virtually excluded other vegetation from the fenced plots at one site by year 5, was now penetrated and overshadowed by young *Betula lenta*, *Acer rubrum*, and *Ailanthus altissima* trees. On a ridgetop site, young maples and a shrub layer of *Rosa multiflora* and *Hamamelis virginiana* in fenced plots apparently

prevented invasion by *Microstegium vimineum*. In a more thickly wooded area, both control and fenced plots had numerous woody seedlings but only those in fenced plots grew to sapling size. (164)

**Messina, Dawn\***, Department of Biology, Mercyhurst College, Erie, PA 16546. *The Use of Lichens As Air Quality Indicators in North Western PA*. — The purpose of this study was to assess the utility of lichens as biomonitoring tools in North Western Pennsylvania. This was done by comparing sample sites close to known air pollution sources in Erie, PA to sites further away from the city that would be presumably less affected by local air pollution sources. The study was also intended to evaluate methods of sampling and identification of lichens including the metric tools that might be used to quantify lichen-based air quality indicators. (176)

**Mikesell, Jan\***, Department of Biology, Gettysburg College, Gettysburg, PA 17325. *Reproductive Capacity in Alliaria petiolata (garlic mustard)*. — Individual seed and fruit mass as well as seed number per fruit were significantly different among lower, middle and upper reproductive branches of garlic mustard plants (Brassicaceae). Average mass decreased continuously acropetally in individual fruits (18%) and individual seeds (20%), but seed number per silique increased continuously acropetally by 27%. Variability of the three characters, as determined by standard error values, increased progressively by one order of magnitude, when separately comparing fruit mass, seed number per fruit and seed mass. Generally, similar data were obtained when analyzing individual or pooled seed weights. However, two distinctions were noted for pooled seed mass: 1) seed weight was smaller by 10%, and 2) variability increased by nearly 300%. There was an inverse relationship between individual seed mass and seed number per fruit, in that both the heaviest and fewest seeds developed in siliques on lower reproductive branches. The lightest and most numerous seeds developed in terminal siliques. (80)

**Miller, Carrie\***, **Andrew Muller**, **Sepideh Yalda** and **Timothy Marcocoe**, Department of Earth Sciences, Millersville University, Millersville, PA 17551. *The Effect of Large-scale Global Atmospheric-ocean Interactions on Local Weather Conditions, A Case Study: Lancaster, Pennsylvania*. — This study examines the effects of significant El Nino-Southern Oscillation (ENSO) processes on the average seasonal temperature and precipitation patterns for Lancaster, Pennsylvania during the summer months of June, July, and August over the period of 1914–2002. Four approaches were employed to demonstrate any existing correlation: 1) significant ENSO events based upon the Japanese Meteorological Agency (JMA) Index were compared with the mean temperature and precipitation values for Lancaster, 2) extreme temperature and precipitation anomalies were examined for possible correlation with significant

ENSO events, 3) an analysis of variance (ANOVA) was performed to test whether a statistically significant difference exists for temperature and precipitation during ENSO events, and 4) the Tukey-Kramer Means Comparison Test was used to determine which ENSO phases were significantly different statistically in regard to temperature and precipitation for each month. (27)

**Monroe, Carrie A.\***, **Renne Carey**, **Mel Zimmerman** and **Edward Gabriel**, Department of Biology, Lycoming College, Williamsport, PA 17701. *Environmental Education Through Videologging of the Lower West Branch Susquehanna River In Collaboration with the Lower West Branch Susquehanna River Conservation Plan*. — In the final stages of approval, the Lower West Branch Susquehanna River Conservation Plan, facilitated by the Northcentral Pennsylvania Conservancy, is becoming increasingly community oriented and receptive to the requests of the public. In response to one of the many implementation strategies of the River Conservation Plan, a Growing Greener Grant was obtained by the Northcentral Pennsylvania Conservancy to implement a videologging project. Videologging allows the segments of the river that the Conservation Plan focuses on, to be viewed from a variety of ariel angles. GPS coordinates are included with each frame of the video allowing the viewer to choose a point along the 75-mile stretch, see it from a different perspective and know its exact location. This useful educational tool can be implemented not only to promote the Conservation Plan and the river itself but can be employed in a classroom setting for research purposes. Data will be presented on the water quality of 17 monitoring sites along the river. (35)

**Morey, Karen\*** and **John A. Cigliano**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104; **Paul Sherbloom**, Department of Chemical and Physical Sciences, Cedar Crest College, Allentown, PA 18104. *Assessment of the Effect of Zinc On Plant Growth in Aquatic and Terrestrial Habitats*. — Zinc is an essential heavy metal but may be toxic at certain doses. The purpose of this study was to determine the impact of zinc on the growth of terrestrial and aquatic plants. We used Brassica rapa (Wisconsin Fast Plants) grown in a hydroponics system to simulate aquatic habitats, and in soil to simulate terrestrial habitats. The plants in the hydroponics treatment were grown at concentrations of 40 µgZnCl/l, the maximum allowable limit by the EPA guidelines, and at 120 µgZnCl/l. Plants in the soil treatment were grown at 300 mgZnCl/kg, also the maximum allowed by the EPA, and 900 mgZnCl/kg. Preliminary analysis suggests that zinc has a strong, negative effect on plants grown in both systems, with greater effects at higher concentrations. Analysis will continue to determine if the effect varies between aquatic and terrestrial systems. However, it appears that zinc is toxic to plants even at concentrations allowable by the EPA. (33)

**Mount, Matthew\*** and **James Sidie**, Department of Biology, Ursinus College, Collegeville, PA 19426. *Albumin Interferes With the Anesthetic Effect of Alkyl Alcohols in a Dose Dependent Relationship*. — Serum albumin has been extensively studied for its capability to bind pharmacological compounds in vivo. Recently, several investigations demonstrated the ability of albumin to bind medium chain length (C20-C26) fatty acids. We are interested in the anesthetic properties of alkyl alcohols in the range of C7 (1-heptanol) to C11 (1-undecanol). These compounds effectively reduce the firing rate of CNS neurons in the pacemaker nucleus of the medulla in the weakly electric fish *Eigenmannia virescens* - Transparent Knife Fish. This neural network drives the Electric Organ Discharge (EOD) in these fish. In our experiments we sought to determine whether bovine serum albumin (BSA) would interfere with the anesthetic action of these alcohols in a dose-dependent fashion. Nonanol alone (10-4M) produces 44% depression in the EOD frequency (EODf); nonanol with 10-4M BSA gives 20% EODf depression; nonanol with 2.5x10-5M BSA yields 30% EODf depression. Decanol alone (5x10-5M) produces 28% EODf depression; nonanol with 5x10-5M BSA gives 10% EODf depression; nonanol with 2.5x10-5M BSA results in 22% EODf depression. Undecanol alone (5x10-5M) produces 32% EODf depression; undecanol with 5x10-5M BSA produces 9% EODf depression; undecanol with 2.5x10-5M BSA results in 26% EODf depression. Bovine serum albumin was observed to interfere with the anesthetic action of alkyl alcohols in a dose-dependent fashion. There appears to be approximately one alcohol binding site per albumin molecule. Supported in part by HHMI/Ursinus Summer Research Program. (96)

**Moyer, E\***, **K. Koch** and **J. Jewett-Smith**, Department of Biology, East Stroudsburg University of Pennsylvania, East Stroudsburg, PA 18301. *Identification and Quantification of the Macroalgal Epiphytes of the Seagrass Zostera marina*. — Epiphytes of the seagrass *Zostera marina* in Chincoteague Bay, VA were studied to determine if epiphyte coverage was sufficient to impair seagrass productivity. Epiphytes were identified and photographed. Water tests to determine salinity, nitrogen, phosphorus and dissolved oxygen were conducted on site using a Hach DR 2000 spectrometer and YSI dissolved oxygen and salinity meters. Samples were collected at four sites, each with four haphazardly chosen sub-sites within the bay from June to October 2002. Seagrass blades were carefully removed and preserved in 4% formalin in seawater(34ppt). To date, three taxa dominate the epiflora of *Zostera marina*: *Ceramium rubrum*, *Enteromorpha clathrata* and *Ectocarpus fasciculatus*, additional species were identified. Current blade coverage ranges from 25%–75%. Preliminary water tests have shown salinity levels 33-38ppt, D.O. ~6.6mg/l, nitrogen 0.00 - 0.03mg/l, and phosphorus 0.28mg/l. This study provides a valuable foundation for tracking changes in the health of the bay's ecosystem. (172)

**Mulligan, James\*** and **Marilyn Daly**, Department of Biology, York College of Pennsylvania, York, PA 17405. *Comparison of Selected South African Daisies with Cultivated Varieties of Commonly Grown Annual Daisies*. — Daisies are popular summer-blooming annuals (Armitage 2001). New cultivars and species from around the world are introduced each year. African daisies are becoming popular in the United States (Daly 1998). Plant trials with well-defined performance criteria provide valuable information to growers and encourage gardeners to include new plants in their gardens. This plant trial evaluated 42 varieties of plants from the genera *Tagetes*, *Cosmos*, *Gaillardia*, *Calendula*, *Arctotis*, and *Dimorphotheca* over a 13-week period. Evaluations were based on vigor, disease/pest resistance, foliage, flower appearance, bloom percentage, uniformity of bloom, uniformity of size, and novel characteristics. Scores were tallied weekly, and a season average was determined for each sample set. Bloom percentage and flower appearance determined a plant's flower rating. Bloom period was also calculated. The top performer, based on overall season average, flower rating, and bloom period was *Arctotis venusta* from Kistenbosch. Gardeners should consider growing this new and unusual Blue-eyed African Daisy. (133)

**Neri, Erica\*** and **Bruce A. Young**, Department of Biology, Lafayette College, Easton, PA 18042. *Multiple Pathways and Contextualization of Hearing in Rattlesnakes*. — Snakes can hear both airborne and groundborne vibrations, and previous studies have suggested that each stimulus type may evoke a consistent behavioral response. To determine the influence of stimulus type we presented a series of designed airborne and groundborne tones to western diamondback rattlesnakes (*Crotalus atrox*) in sensory isolation chambers. Statistical differences in the behavioral responses provide strong evidence of multiple pathways for vibration processing. In a second experiment the snakes were placed in a large open tank, and their immediate environment was manipulated to evoke either predatory or defensive (both calm and agitated) behaviors. Once this behavioral context was established, the snake was presented with a consistent airborne or groundborne vibration. The differential behavioral responses we observed demonstrate that auditory stimuli are contextualized according to the snake's behavioral state. Taken collectively, these results suggest that hearing in snakes may be more complex, and more ecologically relevant, than previously recognized. (75)

**Nightingale, Elizabeth**, **Nels Johnson**, **Tony Davis** and **Susan Klugman**, PNDI-E/Pennsylvania Science Office of The Nature Conservancy, Middletown, PA 17057; **Ryan Evans** and **Charles Bier**, PNDI-W/Western Pennsylvania Conservancy, Pittsburgh, A 15222. *Development of a Riverine Community Classification Model for the State of Pennsylvania*. — Numerous surveys of Pennsylvania's riverine systems are conducted annually, but little work has been done to centralize cross-taxonomic data, define riverine commu-

nities, evaluate the effectiveness of predictive community models, or assess the condition of the riverine communities within Pennsylvania. In an effort to improve our understanding of these aquatic systems, the Pennsylvania Riverine Community Classification Project was recently initiated. There are 5 primary objectives of the project: (1) To centralize, evaluate, and standardize existing aquatic data for Pennsylvania; (2) To produce a classification, description and map of Pennsylvania's riverine biological communities utilizing analyses of results derived from the application of statistical and spatial classification methods to the standardized data; (3) To examine relationships between the defined communities and the abiological characteristics of the aquatic systems; (4) To assess the condition of the communities, by evaluating current and historical community abundance, distribution, and association with various disturbance regimes; and (5) To assess the effectiveness of select existing predictive community classification models. This study will provide a framework for riverine assessment in Pennsylvania, improve our predictive capabilities, help prioritize waterway restoration, define reference conditions and assist the conservation and regulatory communities in making planning, restoration, and conservation decisions. (41)

**Nowicki, Karen\*** and **John A. Cigliano**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Baseline Biodiversity Survey of Mammals in a Meadow Habitat at the Acopian Center for Conservation Learning at Hawk Mountain Sanctuary*. — The purpose of this study is to produce a baseline survey of the mammal community in a meadow habitat at the Acopian Center for Conservation. Woody plants, some of which are non-native invasives, have become established in this meadow. To maintain the site as a meadow, a project is being initiated to identify the best management strategy to decrease invasive woody species and maintain or increase native herbaceous species diversity. This project is part of a long-term study to monitor how the mammal community responds to the various management strategies. Mammals were censused using tracking plates starting in fall 2002. Preliminary results include: white-footed mice (*Peromyscus spp.*), meadow voles (*Microtus pennsylvanicus*), gray squirrels (*Sciurus carolinensis*), chipmunks (*Tamias striatus*), and a mustelid (*Mustelidae*). The chipmunk and gray squirrels are not expected to occur in meadows and is probably a result of the occurrence of woody invasives. (6)

**Olanich, Mary E.\*** and **Deanna L. Dodson**, Department of Psychology, Lebanon Valley College, Annville, PA 17003; **Laura E. Fuhrman\*** and **Dale J. Erskine**, Department of Biology, Lebanon Valley College, Annville, PA 17003. *The Effect of Task Complexity on Gender Differences in Spatial Learning in Rats*. — To assess gender differences in spatial learning, experiments incorporating 60 Sprague-Dawley rats (30 male, 30 female) were conducted employing the Morris water maze task. Black curtains surrounded the pool, elim-

inating extra-maze cues that may have facilitated spatial learning. Assessment commenced with 2 days of habituation testing. Following a 2-day rest interval, rats began 4 days of fixed location testing in which the platform location remained consistent across trials and across days. Then 4 days of alternating location testing followed a 3-day rest interval. In this phase, the platform location alternated for each trial between 2 diagonally opposed quadrants. ANOVAs were computed using latency period to locate the platform as the dependent measure. No significant gender differences were found in the fixed location condition. Males, however, showed significantly lower latencies in the alternating condition. Therefore, gender differences were found only in the more complex spatial task. (147)

**Orwick, Dawn L.\*** and **Richard G. Heller**, Department of Biology, Albright College, Reading, PA 19612. *Ultrastructural Studies of Canine Ectodermal Dysplasia and Epidermolysis Bullosa*. — A correlative study of skin lesions using light, scanning and transmission electron microscopy was conducted at Albright College. The specimens were collected at the University of Pennsylvania's Veterinary Hospital. Each of the lesions was a result of a genetic disease that was isolated in canines, but is parallel to those found in humans. The diseases have been investigated using light microscopy, but only limited electron microscopy studies exist. Tissue samples were collected and prepared for light microscopy by fixation using Karnovsky's fixative, infiltrated and embedded using JB4 resin and stained with hemotoxin and eosin. SEM tissues were fixed with Karnovsky's fixative then osmium tetroxide, critical point dried, and gold coated. TEM tissues were fixed using Karnovsky's fixative and osmium tetroxide then infiltrated and embedded using LR White. Major manifestations in the epidermal layer were found in lesions of *Ectodermal Dysplasia* and *Epidermolysis Bullosa*. (63)

**Palmer, Ashley K.\*** and **Laurie F. Caslake**, Department of Biology, Lafayette College, Easton, PA 18042. *Microarray Analysis of Differential Gene Expression in Escherichia coli in Response to Nitrogen Limitation*. — Prokaryotic cells respond to environmental or chemical stress by the expression of specific proteins characteristic to that stress. Here, we compare the gene expression of nitrogen replete versus nitrogen starved *Escherichia coli* MG1655. RNA was isolated on three different days and the quantity, purity, and integrity of each sample confirmed. The RNA samples from nitrogen replete cells (control) and nitrogen-starved cells (experimental) were pooled to yield one experimental sample and one control sample. The RNA derived from the control and experimental cells were labeled using green and red Alexa dyes. The labeled samples were mixed and hybridized to *E. coli* MG1655 DNA microarrays. Data analysis using Scanalyze (Stanford University) and Excel reveal genes that are differentially regulated in response to nitrogen starvation. Some of the genes found to be up-regulated or down-regulated will be confirmed by northern blot analysis. (47)

**Panah, Assad I.\***, Department of Geology & Environmental Science, University of Pittsburgh at Bradford, Bradford, PA 16701-2898. *Real Time Global Observation and Monitoring of Natural Environmental Hazards — Case Studies*. — Examination of archived real time data from Pitt-Bradford's Telonics Interactive Remote Imaging System (T-RIS) laboratory demonstrates that Polar-orbiting Satellites support a broad range of environmental hazard assessments. These satellites circle Earth approximately in a north-south trajectory, in an ascending or descending mode. The satellites are sun synchronous, each circle the Earth 14 times daily, collecting a large volume of real time data from natural environmental hazards in global scale. The Polar-orbiting Satellite series with 1 km resolution; digitally maps each km on Earth twice a day collecting data from air, water, land, and stratospheric ozone. In this study images from the National Oceanic and Atmospheric Administration (NOAA) Polar-orbiting satellites 10, 12, 14, 15, and 16 were utilized to globally monitor and forecast hurricane land-falls, map forest fires, create weather models, measure sea surface temperature, and apply images for search and rescue. These real-time global observations could be effectively used for forecasting, monitoring and mitigating natural environmental hazards in local scale. The study results suggest that in order to maintain public safety and prevent loss of life and property from naturally occurring environmental hazards we need to "observe globally and act locally." (21a)

**Petrovich, N. M.\*** and **A. F. Wolfe**, Department of Biology, Lebanon Valley College, Annville, PA 17003. *Microscopic Study of the Cuticular Setae on the Body of Artemia franciscana*. — Numerous setae, surrounded by smaller spines or basal protuberances, are distributed along the dorsal and ventral surfaces of the brine shrimp, *Artemia*. Generally, a pair of setae are found on each surface of the trunk and abdominal segments. Scanning electron, transmission electron and light microscopy were used to examine the morphology of these projections. The setae and spines form a cluster of a single, slender-shafted seta surrounded by a circlet of small, thick spines of varying heights. The lack of detectable pores in the setae, as well as their ultrastructure, suggests that they are mechanoreceptors. The distribution of setae over the entire body surface could provide the organism with environmental cues. (167)

**Pitkin, Ruthanne B.\***, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Why Do Mendel's Peas Wrinkle?: A Lab that Links Genotype and Phenotype*. — The difference between wrinkled and round pea phenotype is the result of a gene that codes for a starch branching enzyme. On the cellular level, the result of dominant allele is an efficient enzyme that leads to the formation of simple starch grains and normal osmotic potential. The recessive gene codes for an inefficient starch branching enzyme that results in compound starch grains, another starch branching enzyme turned on late in development, which produced an

increased osmotic potential. The students determine three phenotypes: type of starch grain, presence or absence of starch branching enzyme turned on late in development and osmotic potential. The students use their data to deduce the genotype of three varieties of peas. Basic biological concepts such as the Central Dogma, structure of proteins, structure of starch, Mendelian inheritance, and osmosis are used in this lab. The laboratory manipulations are easy to do and to set up. The students need to be able to make a wet mount, use a microscope, test for starch and use a balance. Our students write a formal lab report about this lab and find the integration of the data, Mendelian dominant and recessive, round and wrinkled and cellular event challenging to integrate. Thomas Fogle of St. Mary's College, Notre Dame, IN developed this lab. (150)

**Ponder, Elizabeth L.\*** and **Bernard Fried**, Department of Biology, Lafayette College, Easton, PA 18042. *Experimental Infection of Helisoma trivolvis (Colorado Strain) Snails with Cercariae of Echinostoma caproni*. — *Helisoma trivolvis* (Colorado strain) snails were used as a second intermediate host to study the effects of diet on cercarial encystment of *Echinostoma caproni* released from experimentally infected *Biomphalaria glabrata* snails. A total of 12 snails ranging from 2-3 mm in shell diameter and maintained on either a lettuce diet (6 snails) or a hen's egg yolk diet (6 snails) were each exposed to 25 cercariae in 0.5 ml of artificial spring water (ASW) for 24 hr to compare encystment. At necropsy, 16-25 cysts were recovered from snail tissue in each of the 12 snails. The lettuce fed snails had a statistically greater (Student's t-test,  $P < 0.05$ ) number of cysts than those fed yolk. To determine maximum encystment, a total of 12 snails of the same size range maintained on either a lettuce diet (6 snails) or a hen's egg yolk diet (6 snails) were each exposed to 75 cercariae in 8 ml of ASW for 24 hr. In each of the 12 snails, 39-69 cysts were recovered; however, no significant difference (Student's t-test,  $P > 0.05$ ) was found between the number of cysts recovered in snails maintained on the lettuce versus hen's egg yolk diet. (84)

**Prasad, A.\***, **K. Howell** and **J. Coren**, Department of Biology, Elizabethtown College, Elizabethtown, PA 17022. *An Improved Pac Shuttle Vector System for Bidirectional Deletion Analysis*. — A remaining goal of the Human Genome Project is to investigate gene regulation. To address this we constructed the PAC shuttle vector pJCPAC-Mam1 that can be propagated in both bacterial and human cells. This vector contains a loxP site, so genomic DNA cloned into it can be subjected to loxP-Cre mediated deletion events. In order to make this system more useful, we introduced a mutated version of the loxP site on the opposite side of the genomic insertion site of the PAC vector. We also constructed new transposon vectors containing the same mutated loxP site and a tetracycline-resistance gene and demonstrated that nested deletions can be generated using the mutated loxP elements. This transposon deletion technology will allow

individuals to generate nested deletions from both ends of any genomic insert of interest. This improved PAC vector system can be used to identify previously uncharacterized genes, to investigate gene regulation, and to delineate 5' and 3' gene boundaries. (115)

**Rausch, Matt\*** and **Robert A. Kurt**, Department of Biology, Lafayette College, Easton, PA 18042. *The Effects of Secondary Lymphoid Chemokine Exposure on T Cell Receptor Signaling Molecules and Cytoskeletal Elements*. — Chemokines are a group of low-molecular-weight polypeptides that play a key role in mediating chemotaxis and immune responses. However, chronic chemokine exposure or high levels of chemokines have been shown to impair immune function. Secondary lymphoid-tissue chemokine (SLC) is a specific chemokine that is involved in recruiting naïve T cells into secondary lymphoid tissues, including the lymph nodes and spleen to begin a T cell response. Previous work has shown that T cells subjected to prolonged SLC exposure produced significantly lower levels of INF- $\gamma$  than control cells in response to anti-CD3 stimulation. Therefore, chronic SLC exposure adversely affects T cell function. In order to determine how T cell receptor proteins are affected by SLC exposure, we are investigating the molecules of the T cell receptor and the cytoskeletal elements using confocal microscopy. (56)

**Reed, Seth\***, **Michael Sherick**, **Amy McEuen**, **Michael Steele** and **Tom Contreras**, Department of Biology, Wilkes University, Wilkes-Barre, PA 18766; **Peter Smallwood**, University of Richmond, Richmond, VA 23173. *The Effects of Oak Mast on Acorn Dispersal and Establishment: A test of the Predator Satiation Hypothesis*. — The Predator Satiation Hypothesis (PSH) suggests that masting, the synchronized episodic production of seeds by many tree species, evolved in response to seed predators, and that seed survival and establishment occur only during high mast years. Larger acorn crops, for example, should result in a higher proportion of cached seeds and an increased probability of seedling establishment. To test this, we monitored acorn production and followed the fate of tagged acorns at three sites over four years in NE Pennsylvania. Preliminary results support the PSH: increased acorn production resulted in increased caching as well as a greater probability of seedling establishment. Moreover, it appears that production of acorns by red oaks (subgenus *Eythrobalanus*), compared with production by white oaks (*Quercus*), may be more important in promoting hoarding and establishment of acorns. We discuss the influence of mast production on the energetics of hoarding decisions and the impact of these behavioral decisions on seedling establishment. (160)

**Rhone, Diane M.**, **Maureen A. Levri** and **Edward P. Levri**, Division of Math and Science, Penn State - Altoona, Altoona, PA 16601. *The Influence of Deer Herbivory on Establishment and Reproductive Success of Mountain laurel*

(*Kalmia latifolia*). — Deer can alter the distribution and abundance of plants. The purpose of this study was to establish both vegetative and reproductive baseline data for *Kalmia latifolia* for a long-term deer exclosure study. Inside and outside of the exclosure, we measured leaf survivorship. We compared the density of younger plants and older plants. Also, we compared the number of plants flowering, and we measured the self fertilization rate by determining fruit set. We found no significant difference in leaf survivorship, density of younger plants, or self fertilization rates. Older plants grew more densely outside the exclosure, and more of these plants were flowering this season. Flowers left open to pollinators were more likely to set fruit than flowers left to self-fertilize. Since the deer exclosure is only two years old, we suspect that it may take several more years to detect an effect of deer herbivory if an effect exists. (165)

**Richardson, Jonathan L.\***, **Ruwani Bandaranayake** and **Christopher Sneringer**, Department of Biology, Franklin and Marshall College, Lancaster, PA 17604. *Geobotanical Relationships at Chickies Rock County Park (S.E. PA), and the Complicating Legacy of Roadbuilders*. — Bisected into Lancaster and York County sections by the Susquehanna River, the Chickies Anticline is a Piedmont outlier of Pennsylvania's Ridge and Valley Province. At Chickies Rock County Park, geologic, topographic and microclimatic diversity contribute to a rich vegetation mosaic, but to these natural causes must be added another contributor — human disturbance. Road-building activities, the focus of this paper, have in some cases clarified natural geobotanical relationships, but in others have obscured them, producing surprising plant patterns such as hackberry trees atop a quartzite ridge, and pale corydalis deep in a phyllitic gorge. Past road-building activities, some involving large-scale transfers of rock and soil debris but some smaller and/or obscured by time, often underlie such "anomalies". (7)

**Rizzo, Stacy A.\***, **Chuck Angelo**, **Jesse Hassan**, **Jim Mack**, **Erica Robaczewski**, **Kenneth Klemow** and **William Toothill**, Department of Biology, Wilkes University, Wilkes-Barre, PA 18766. *Impact of Abandoned Mine Drainage on Riparian Plant Communities Along Streams in the Wyoming Valley of Northeastern Pennsylvania*. — Abandoned mine drainage (AMD) is a major water pollution problem in northeastern Pennsylvania. While studies of the impacts of AMD on animal life and general vegetation features have been conducted, few studies have examined the effects of AMD on riparian plant communities directly adjoining the stream. To that end, we sought to determine if riparian vegetation differs between AMD-impacted and non-impacted streams, using both field-based assessments and remote sensing. Multispectral satellite imagery and aerial photography were used to classify and compare field-based riparian vegetation data of the AMD-impacted creeks to the data collected from non-impacted creeks. Measured vegetation parameters differed greatly from site to site, and AMD

appears to be one of several factors (including prevailing soils and disturbance history) affecting the nature of riparian vegetation along streams in the Wyoming Valley. (175)

**Robison, Jennifer\*** and **Carol Loeffler**, Department of Biology, Dickinson College, Carlisle, PA 17013. *Investigations on the Life History of two Invasive Species: Alliaria petiolata (M. Beib.) Cavara & Grande and Hesperis matronalis L.* — *Alliaria petiolata* (M. Bieb.) Cavara & Grande and *Hesperis matronalis* L. are invading forests almost nationwide and threatening many native species. *Alliaria petiolata* seed germination requirements for two different populations (Pennsylvania vs. North Carolina) are being examined with varying treatments (buried scarified, surface scarified, buried nonscarified, surface nonscarified) and cold treatment lengths (0, 8, 16, 24 weeks, 4°C) followed by 8 weeks in an climate chamber (20°/8° 16/8 hr light/dark) during which germination is recorded. *Hesperis matronalis* reproduction requirements are being investigated by growing seedlings from a Pennsylvania population in various cold treatment lengths (0, 4, 8, 12, 16 weeks, 4°C 8/16 hr light/dark), and monitoring the plants for bolting and flowering. Initial data for *A. petiolata* indicate a significant difference in germination requirements with North Carolina requiring a shorter cold period. This may indicate specialization to the environment which must be considered for controlling populations. (154)

**Roessner, Elizabeth\*** and **John A. Cigliano**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Comparison of the Small Mammal Community Between a Forest Fragment and an Abandoned Christmas Tree Farm at the Acopian Center for Conservation Learning at Hawk Mountain Sanctuary (Kempton, PA)*. — The objectives of this study were to census the mammals inhabiting two different woodland habitats, a mixed-oak forest fragment and an abandoned Christmas tree farm that borders the forest fragment, and to determine any differences in mammal community structure. The data will be used as a baseline for a study on the faunal response to habitat restoration and management of invasive plant species and to determine the conservation value of the abandoned Christmas tree farm. We use tracking plates to sample the habitats. Sampling will take place from September 2002 until February 2003. We will determine the species richness of each habitat and the Jaccard coefficient will be calculated to quantify community similarity. The conservation value of the Christmas tree farm will be determined based on species use. We have identified 6 species from the Christmas tree farm and 9 species from the forest fragment. Similarity is 67%. (10)

**Roller, Rebecca L.\*** and **Bradley G. Rehnberg**, Department of Biology, York College of Pennsylvania, York, PA 17405. *The Assessment of Timed Pre-natal Lead Exposure on Neural Development Based on Task Performance in CD1 Mice*. — Childhood lead poisoning persists as an environ-

mental health problem and has been determined to adversely affect neural development. Our study attempted to isolate the time during pregnancy in which lead teratogenesis occurs. Nine pregnant CD1 mice were administered 2000 ppm lead acetate in their drinking water during either week one, two, or three of the gestational period. Three mice served as controls and were administered no lead. Following parturition, lead exposures were stopped and the pups nursed until weaning at day 21. Neural development tests involved the righting reflex, negative geotaxis, olfactory discrimination, and the Morris water maze. We found that mice exposed to lead took longer to right themselves and to reorient on a 25 degree incline. In addition, they were weaker swimmers and took longer to escape from water in the Morris water maze. In conclusion, lead appeared to affect behavioral and cognitive function in pups, particularly if exposure occurred during the third week of gestation. (179)

**Round, Oliver\*** and **Bruce A. Young**, Department of Biology, Lafayette College, Easton, PA 18042. *Vertical Posturing and Pendular Mechanics in Cobras*. — Vertical posturing (often with hooding) is a common defensive behavior in cobras. We explored the mechanics of vertical posturing as well as the physics of the subsequent strikes. We documented the segmental, and whole body, center of gravity in a variety of live and preserved cobras. Quantifying still images and high-speed digital videorecords allowed us to mathematically determine the center of gravity and strike trajectories from several live cobras. By documenting the distribution of the cobra's body segments, we demonstrated that the body's center of gravity both limits the extent of the vertical display and dictates the stability and coiling pattern of the horizontal portion of the snake. By treating the vertical portion of the cobra's body as an inverted pendulum, we could model the trajectories of the defensive strikes. Deviations from these model trajectories revealed that the cobras employ kinematic chains, rather than pendular mechanics, during their defensive strikes. (73)

**Rummel, Shawn M.\***, **Sarah C. Grabowski\*** and **Fred J. Brenner**, Department of Biology, Grove City College, Grove City, PA. *The Impact of Acid Mine Drainage on the Seaton Creek Watershed*. — Seaton Creek watershed, located in northwest Pennsylvania, has been adversely impacted by acid mine drainage (AMD) for over a hundred years. Since 1995, Seaton Creek and Murrin Run, both major tributaries of Slippery Rock Creek, have been monitored to determine the impact of AMD on the Seaton Creek watershed. Samples were collected on a monthly basis from eight different sampling sites within the watershed. These samples were analyzed for pH, conductivity, total dissolved solids, alkalinity, acidity, sulfates, iron, manganese, and aluminum. Passive treatment systems have been installed to treat acidic discharges above 5 of the 8 sampling stations. The pH and alkalinity has increased along with a corresponding decrease in metal concentration for the stations

with passive treatment systems while the other three stations have become more acidic over the same time frame. The sulfate concentrations have decreased at all sampling locations during the past year. Throughout the watershed aluminum concentrations have decreased while manganese and iron samples have remained relatively stable over the past year. (37)

**Ryan, Rachael\*** and **Frank T. Kuserk**, Department of Biology, Moravian College, Bethlehem, PA 18018. *The Relationship Between Larval Populations of the Sacramento Mountains Checkerspot Butterfly, Euphydryas anicia cloudcrofti and its Host Plant, Penstemon neomexicana*. — Ten populations from within the known range of the Sacramento Mountains Checkerspot Butterfly, *Euphydryas anicia cloudcrofti*, were studied over an eleven-week period to determine the relationship between larval densities with respect to the insects' primary host plant, *Penstemon neomexicana*. Both species are indigenous to the Sacramento Mountains, which are part of the Lincoln National Forest in south-central New Mexico, and inhabit meadows within mixed-conifer forest at elevations of 2,450-2,750 m. This endangered checkerspot species is narrowly endemic to 15 localities within an 85 sq km area only 8 km from the village of Cloudcroft, Otero County, New Mexico. It is a specialist, feeding on only a single adult nectar source, *Helenium hoopesii*, and the larval host plant, *Penstemon neomexicana*. This study found that that the checkerspot larval populations were not dependent on the number of *Penstemon* host plants, but rather on the quality of plants, especially their age and size. (156)

**Salvatore, Michael\***, **Katherine Siddoway\*** and **Carol Loeffler**, Department of Biology, Dickinson College, Carlisle, PA 17013. *Deer Browsing and Recruitment Failure as Factors in the Continuing Decline of PA Populations of a Rare Wildflower, Euphorbia purpurea*. — We monitored all individuals in five PA populations of the globally rare wildflower glade spurge, *Euphorbia purpurea* (Raf.) Fern. Over eight years, rates of white-tailed deer browsing were consistently less than 10% in a State Gameland but ranged to over 80% in less heavily hunted areas. Deer browsing halted the current year's growth and often had significant negative effects on plant size in the subsequent growing season. Size reduction in turn reduced the incidence of flowering and seed production. Seedling survival to the next season has been low since 1997, perhaps reflecting drought and plant competition. In 2002, the first successful seedling recruitment in one fenced population and the first seed production in a second fenced population provided hope that fencing and weeding will reverse declines in some populations, after which control of the deer herd and careful forest management could eventually allow *Euphorbia purpurea* to maintain itself in Pennsylvania. (152)

**Sampsel, Todd\***, Director, Northwest Conservation Program, Western Pennsylvania Conservancy, Union City, PA 16438; **Nevin T. Welte**, Department of Biology, Mercyhurst College, Erie, PA 16504. *Preliminary Control Planning for Invasive Plant Species at Lake Pleasant Ponds*. — During the fall of 2002, a preliminary survey was conducted of invasive species occurring at man-made ponds in the watershed of Lake Pleasant in Erie County, Pennsylvania. The Western Pennsylvania Conservancy (WPC) seeks to minimize the risk that invasive species might establish in the Lake Pleasant ecosystem due to documented occurrence there of PA plant species of special concern. *Phragmites australis* and *Typha x glauca* were the primary problem species initially identified in these habitats, which are in close proximity to wetlands adjacent to Lake Pleasant. The approximate stand size and locations of the invasive plants were mapped using GPS and preliminary control measures were applied to estimate the effort required to control the plants. Man-hours needed for mechanical control were estimated. Based on this preliminary work, a management plan with recommendations for invasive species control was developed for WPC-owned properties at Lake Pleasant. (85)

**Satuh, Shirley A.\***, **Alissa E. Romano** and **Shyamal K. Majumdar**, Department of Biology, Lafayette College, Easton, PA 18042. *Selenium Induced Apoptosis In Two Different Cancer Cell Lines*. — Selenium is a trace element required by living organisms in minute amounts. In recent years, selenium has become the focus of cancer chemoprevention. This study examines the effect of seleno-L-methionine on human prostate cancer cells (CRL-10995) and murine erythroleukemic cells (GM-86). Cell multiplication was measured through growth rate, generation time, and percent viability. The chemical significantly inhibited cell proliferation in both cell lines. Light microscopy revealed an increased nuclear condensation and fragmentation in cells exposed to seleno-L-methionine, a characteristic feature of cells undergoing programmed cell death (apoptosis). Annexin V-Enhanced green Fluorescence Protein (EGFP) assay identifies the early stages of apoptosis through the detection of translocation of phosphatidyl serine (PS) from the inner to the outer cell membrane. The green dye has a high affinity for PS. The cells undergoing apoptosis display a green halo with bright green spots on the membrane, where the dye has bound to PS. Our study revealed a higher incidence of PS translocation in selenium treated cells, which suggests selenium induced apoptosis. DNA strand breakage is a hallmark of apoptosis; it is caused by specific endonucleases cleaving the strands during the late phases of apoptosis. The study showed more DNA strand breakage in selenium treated cells compared to the controls. (17)

**Schantz, Jeanine M.\*** and **John A. Cigliano**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *A Baseline Entomological Survey of the Meadow at*

*the Acopian Center for Conservation Learning at Hawk Mountain Sanctuary*. — We conducted a baseline survey of the insect fauna in meadow of the Acopian Center for Conservation Learning. Through succession, woody plant species, some of which are non-native invasive species, are becoming established in the meadow. To maintain the site as a meadow, a project is being initiated to identify the best management strategy to decrease invasive woody species and maintain or increase native herbaceous species diversity. This project is part of a long-term study to monitor how the mammal, insect, and microsnail communities respond to the various management strategies and the subsequent restoration of the field habitat. Insects were observed and sampled using sweep nets and tac traps over 5 weeks in fall 2002. Specimens were only collected and preserved if needed for identification. Approximately 500 specimens were identified to the lowest taxonomic category possible. Preliminary analysis suggests that hymenoptera is the dominant taxa in the meadow. (158)

**Schnell, George A.\***, Department of Geography, SUNY New Paltz, New Paltz, NY 12561. *The Demographic Status of Nations at the end of the 20th Century: A Sample Survey*. — Today, many nations have birth and death-rates that are close numerically and, therefore, enjoy very low natural increases—thanks to the demographic transition (the human response to the Urban-Industrial Revolution). Accompanying low growth is a concomitant more-developed status featuring a higher standard of living than those nations whose struggle to develop is hampered by gains in population that exceed the more-developed group's. Those classed as less-developed often had foreign aid promoting longevity that, in turn, contributed to often rapid mortality reductions. Unfortunately, these populations were least able to control their fertility and relatively rapid growth was inevitable—and continues today. The crux of the problem is thus the recalcitrant disparity between the numbers of births in excess of the deaths in the less-developed realm. (26)

**Schrack, Katie E.\*** and **Laurie F. Caslake**, Department of Biology, Lafayette College, Easton, PA 18042. *Analysis of Class 1 Integron in Multiple Antibiotic Resistant Environmental Isolates*. — Integrons and their gene cassettes are important mobile molecular elements that allow bacteria to exchange genetic material, particularly antibiotic resistance genes. In previous work we analyzed mercury-resistant (to 100  $\mu$ M HgCl<sub>2</sub>) and mercury-sensitive environmental isolates from Onondaga Lake for multiple antibiotic resistances. Of the isolates from water, 92% of the mercury-resistant and 96.5% of the mercury-sensitive isolates were resistant to two or more antibiotics. Of the isolates from sediment, 84.8% of the mercury-resistant and 45.8% of mercury-sensitive isolates were resistant to two or more antibiotics. Overall, the proportion of mercury-resistant and mercury-sensitive isolates from the water that carry multiple antibiotic resistances is nearly identical. From the sediment

environment, however, twice as many mercury-resistant isolates carry multiple antibiotic resistances compared to the mercury-sensitive isolates. We are analyzing these antibiotic resistant environmental isolates for the presence of a class 1 integron by PCR analysis. (51)

**Schwengel, Johanna M.\*** and **Alan B. Hale**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Investigation of Specific Genes within a Newly Sequenced Bacteriophage*. — The nucleotide sequence of temperate bacteriophage KLphi1, a bacterial virus that infects *Janthinobacterium lividum*, has been nearly determined. Upon investigation into open reading frames and putative sequence homologies, KLphi1 has shown similarities to phiCTX, a bacteriophage that infects *Pseudomonas aeruginosa*. Several putative coding regions, such as portal vertex, terminase, major capsid, tail fiber, and head scaffolding, are examples of these similarities. In addition, gene ctx, which in phiCTX, encodes a pore forming cytotoxin protein, exhibits sequence similarity. Some genes, such as ctx, are expressed only when incorporated into a bacterial host genome, while other genes are expressed following prophage induction, but still within the host. The presence of such a phage gene within the host is confirmed by PCR. Studying the expression of these genes will help determine whether there is homology between KLphi1 and phiCTX coding regions, as well as, develop a better map of the KLphi1 genome. (107)

**Shaffer, Amie L.\*** and **Diane M. Bridge**, Department of Biology, Elizabethtown College, Elizabethtown, PA 17022. *Isolation of the TrkB gene from a Simple Invertebrate*. — We have isolated a portion of the TrkB gene, which codes for a receptor tyrosine kinase, from *Podocoryna carnea*. *P. carnea* belongs to the invertebrate phylum Cnidaria. Since the Cnidaria is one of the earliest arising animal phyla, cnidarians provide insight into the origin of genetic pathways and developmental processes. TrkB encodes a receptor for neurotrophins, proteins which regulate neuron survival and differentiation and neurite growth. The TrkB receptor specifically binds brain-derived neurotrophic factor (BDNF) and NT-4/5. To isolate a portion of the gene, degenerate PCR primers were designed. Phylogenetic analysis was performed to confirm that the sequence obtained was from a TrkB gene. Our data provide the first evidence that neurotrophins were present before the evolution of bilaterally symmetrical animals. Isolation of the remainder of the coding portion of the gene is in progress, using RACE PCR. TrkB expression will be examined using RNA in situ hybridization. (92)

**Shaya, Melissa\*** and **Laurie Caslake**, Department of Biology, Lafayette College, Easton, PA 18042. *Analysis of Chondroitin AC Lyase from Flavobacterium columnare*. — *Flavobacterium columnare* infects and produces diseases in both cold (15°C) and warm (27°C) water fish and can cause

death in as short as 24 hours. The disease is recognized by lesions on the gills and skin of the fish. Chondroitin AC lyase, which degrades polysaccharides, may contribute to *F. columnare*'s ability to produce morbidity and mortality. Chondroitinase activity assays from *F. columnare* isolated from both cold water and warm-water fish revealed that the cold-water isolates had a significant elevation in activity compared to isolates from warm-water fish. To answer the question of whether the difference in activity is due to a structural difference in the protein, the *csIA* gene, which encodes chondroitin AC lyase, from a cold-water and warm-water isolate is being cloned and sequenced. (45)

**Shea, Neil M.\***, Kutztown University, Kutztown, PA 19530. *Estimating the Coriolis Effect in the Toilet Bowl.* — It is commonly believed that the direction of circulation of water down a drain or in a toilet bowl is governed by the Coriolis effect. However, giving the issue a quick mathematical glance shows that this is not so. The equations for the Coriolis effect were combined with the equations of dynamics for systems whose sizes are on the order of a toilet bowl and it can be easily seen that the speed of rotation is several orders of magnitude too large to be caused by the Coriolis effect. (28)

**Sheard, Amanda M.\*** and **Alan B. Hale**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Is RFLP Analysis a Predictor of Viral Host Range?* — Comparisons of bacterial genomes frequently show significant sequence differences even among strains of the same species. Examining these differences is important to understanding the evolution that has occurred within a natural community. This study used RFLP analyses to examine genetic variation among 17 strains of *Janthinobacterium lividum*. *Pseudomonas aeruginosa*, a bacterium whose phage share a high level of genetic similarity with *J. lividum* phage, was used as an outgroup. Top agar overlay procedures have shown that each of the 17 strains of *J. lividum* is susceptible to a unique set of bacteriophage. Given the precise method by which bacteriophage adsorb to their host, bacterial strains infected by similar phage will likely have similar receptors, and therefore, possibly more similar genomes. In this case, RFLP analyses would serve as a genetic predictor of phage host range, an approach more efficient than having to identify specific genes that determine host range. (58)

**Sheldon, Joseph K., Rachel Gallusser\*** and **Gretchen Radke\***, Department of Natural Sciences, Messiah College, Grantham, PA 17027; **Charles Mason**, Department of Entomology, University of Delaware, Newark, DE. *The Effect of Bt Corn Pollen on Adult Green Lacewing (Chrysoperla carnea) Fecundity and Survivability.* — The tissues of corn plants (*Zea mays*) have been genetically engineered to contain the endotoxin of *Bacillus thuringiensis* in an effort to control the European corn borer (Lepidoptera: *Ostrinia*

*nubilalis*). Concern has been raised about the effects of Bt corn on non-target species. Green lacewings (*Chrysoperla carnea*) are important insect predators as larva, but feed on pollen as adults. *Chrysoperla carnea* adults, were fed Mycogen 2249 IMI 176 Bt, Mycogen 2250 IMI, Pioneer 38G17 Mon 810 Bt, and Pioneer 3893 pollen to determine any negative effects of the diet on *C. carnea* survivability and fecundity. Tentative results show no significant negative effects on adult survivability or egg development. No significant negative effect of the Mycogen Bt strain on fecundity was found, however Pioneer Bt pollen significantly reduced egg production. A confirmational study of the Pioneer 38G17 Mon 810 Bt effect will be conducted in Spring 2003. (178)

**Silva, Willetta Wyatt**, Department of Psychology, Villanova University, Villanova, PA. *Neurogenesis: Unleashing the Regenerative Potential of the Adult Brain.* — Studies in 1999 by Kumperman and Gage indicated that new nerve cells could be created in the mature human brain in the aftermath of neurological injury. Such findings echo the early work of Hebb, suggesting that "Cells which fire together, wire together." Originally observed in rat studies, these observations hold the key to treatment of Alzheimer's, Parkinson's and other disabilities that accompany stroke and trauma. This process is facilitated by environmental stimulation as is evidenced in increased levels of some neurotransmitters. Regeneration appears to be positively linked to genetic expression of regulatory, neuro-chemical processes and negatively to stress. This paper will evaluate the specific steps of Neurogenesis (stem cell proliferation, survival of progeny, migration and differentiation) to provide an update on current research efforts such as PET (positron emission tomography) and MRI (magnetic resonance imaging). Suggestions will be made concerning supportive environmental stimuli that serve as positive facilitators. (66)

**Silver, Martine T. and Brian S. Misanko**, Department of Biological Sciences, Cedar Crest College, Allentown PA., 18104. *Classification of Brain Tumors Using Magnetic Resonance Spectroscopy.* — Each year 15,000 new patients are diagnosed with primary brain tumors. Currently, brain tumors are only accurately identified by a biopsy. This invasive procedure can result in infection, brain injury and scarring. A noninvasive procedure would be more beneficial to patients. Magnetic resonance spectroscopy (MRS) is a non-invasive procedure thought to be useful in identifying brain tumors. MRS can be used to evaluate metabolic patterns in the brain. These metabolic patterns may be able to distinguish between types of tumors. A quantitative approach is being used to develop a protocol. This protocol would be utilized in the identification of brain tumors. This approach involves calculating brain metabolic concentrations. The metabolites measured were N-acetylaspartate (NAA), Creatine (CR) and Choline (Ch). Absolute concentrations were used for a metabolic discrimination of brain tumors from other focal lesions. MR Spectroscopy helps in tissue charac-

terization of intracranial lesions and may help classify brain tumors. (143)

**Singer, Meredith\*, Karen Dunlap, Kristen Koenig and Bruce A. Young**, Department of Biology, Lafayette College, Easton, PA 18042. *How Spitting Cobras Spit.* — Previous studies of spitting in cobras have focused on the specialized morphology of the fang's exit orifice. This dentitional morphology explains the unusual directionality of the venom stream, but not the actual mechanics of spitting. Spitting cobras are unusual among venomous snakes in that they routinely expulse venom without making physical contact with their target, suggesting that these snakes possess a specialized release mechanism for venom flow. To document this release mechanism we explored venom expulsion in two spitting (*Naja nigricollis* and *N. pallida*) and two non-spitting (*N. haje* and *N. melanoleuca*) cobras. Using photography and high-speed digital videography, we documented unusual skeletal displacements of the upper jaw associated with venom spitting. Through comparative histology and dissection of the venom delivery apparatus, we determined key anatomical specializations in the upper jaw associated with these skeletal displacements. Experimental manipulations were performed to confirm the functional basis of venom flow during spitting. (74)

**Skinner, John\*** and **Lauren Yaich**, University of Pittsburgh at Bradford, Bradford, PA 16701. *Phenotypic Analysis of Drosophila melanogaster Neural Development Mutants.* — The development of the *Drosophila* nervous system is controlled by many genes working together in an intricate network of molecular genetic interactions. In this study, the neural phenotypes of two *Drosophila melanogaster* mutant strains, l(3)10585 and l(2)08307a, were analyzed. Immunohistochemical stainings were performed to highlight the neural phenotype, using antibodies anti-cut and 22C10. Our preliminary analysis suggests that neural abnormalities are present. The process leading to the subcloning of these genes has also begun, in hopes of eventually understanding the molecular mechanisms of how these genes control developmental processes. (54)

**Smith, Alexandra\*, Anuj Kalsy, Gerald Hess and Lawrence Mylin**, Department of Natural Sciences, Messiah College, Grantham, PA 17027; **Melanie Epler, Todd Schell and Satvir Tevethia**, Department of Microbiology and Immunology, The Pennsylvania State University College of Medicine, Hershey PA 17033. *Selection and Analysis of SV40 T Antigen Escape Variant Mutations.* — The Simian Virus 40 (SV40) Large Tumor Antigen (T ag) contains four distinct epitopes, I, II/III, IV, and V, that are each recognized by one or more H-2b-restricted cytotoxic T lymphocyte clones (CTL). Because the SV40 T ag induces cellular immortalization and tumor formation, we are interested in these epitopes as targets for the immunotherapy of SV40-induced murine tumors. One way that T antigen positive

cells may avoid lysis by CTL directed predominantly against a single epitope is through alteration of the target epitope sequence by amino acid substitution or deletion. Our goal is to understand factors which influence the types of mutations which will favor escape during in vitro selection. Escape variant populations have been established by selection of T antigen transformed cells with multiple different T antigen-specific CTL clones. Variant epitope sequences were identified by sequencing of recombinant plasmids obtained by subcloning epitope region sequences which were amplified from the variant populations by PCR. Our results suggest that factors related to both target epitope and selecting CTL clone influence the diversity of escape variant mutations. (61)

**Smith, Bruce\*** and **Christina Gouirand**, Department of Biology, York College of Pennsylvania, York, PA 17405. *A Study of Early Ovule Development of Impatiens pallida Nutt. Using the Herr Clearing Technique.* — *Impatiens pallida* Nutt., known as pale jewelweed, is a yellow flowered member of the Balsaminaceae family often confused with the species *I. capensis* Meerb. which has darker orange petals. Flowers were collected in York and Adams County and prepared for phase contrast microscopy using the Herr Clearing Technique. Voucher specimens were prepared for the York College herbarium. Previous studies have provided evidence that this technique is more rapid and produces morphological evidence not obtainable in serial sectioning methods. Digital images of whole flowers, ovaries, and ovules will be shown along with selected stages of megasporogenesis and megagametogenesis. (78)

**Smith, Elizabeth\*, Rose Moran\*, Jennifer Stephens\* and Richard Kliman**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Analysis of DNA Sequence Variation in the Drosophila simulans Species Complex.* — *Drosophila simulans*, *D. mauritiana* and *D. sechellia* comprise a well studied group of sibling species. They serve as an ideal model system for the study of speciation. This complex is also well suited for studying the evolution of codon usage because codon preferences are already known. In addition, DNA sequencing is made easier because of these species' close relationship to *D. melanogaster*. We are sequencing several genes in *D. mauritiana* and *D. sechellia* in order to obtain estimates of DNA sequence polymorphism and divergence. Along with data from *D. melanogaster* and *D. simulans*, we can use this new data to infer important features of these species' natural history (timing of divergence events, historical population sizes, etc.). We can also use the patterns of polymorphism to test for natural selection on codon usage. (116)

**Sowers, Anthony\*, Jennifer Clark, Mel Zimmerman and Michelle Briggs**, Lycoming College. *Fungal Biomass and Roll In Leaf Processing In Two North Central PA Streams.* — Leaf Processing of three plant species, sugar maple (*Acer*

*saccharum*), river birch (*Betula niagra*), and pin oak (*Quercus pulustris*) was studied in two North Central Pennsylvania streams during summer and fall. Processing rate (k), organic content and macroinvertebrates were monitored from leaf packs, leaf discs and leaf mesh bags at 7, 14, 21, 28 and 35 day intervals. Ergosterol was extracted from leaves and measured with HPLC. Measurements of spore densities of filtered stream water were also made. Summer results indicated processing (k) of 0.017m 0.0056 and 0.0086 for maple, birch and oak, respectively. Fungal biomass increased during the 35 days of incubation, however no significant difference in fungal biomass was shown between sites, species or method. A comparison of summer and fall rates will be made. (124)

**Stankiewicz Gabel, Rebecca L.\***, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Discerning Palates: Can Larvae "Taste" Bt Endotoxins.* — Larval feeding behavior was examined in diet choice studies conducted for first instar *Helicoverpa zea* (Boddie) larvae on artificial diet with and without the incorporation of *Bacillus thurengiensis* Cry1A(c) endotoxin. Larvae showed a significant preference for diet without the endotoxin. Moreover, insects that were exposed to Cry1A(c) showed slower growth than those not exposed. Larvae that were given a choice between diets showed intermediate growth rates to those exposed only to toxin or toxin free diet. These results demonstrate that while *H. zea* larvae can detect Bt toxin in their diet, they must first sample the toxin, which inhibits their overall development. The effects of this behavior on resistance management will be discussed. (19)

**Staretz, Marianne, Lori-Lynn Predmore\* and Devon Ingram\***, Department of Chemistry, Cedar Crest College, Allentown, PA 18104. *Identification of the Specific Cytochrome P450(s) Inhibited by Phenethyl Isothiocyanate Thru Affinity Chromatography.* — Lung cancer is the leading cause of cancer deaths in the United States. The major cause of lung cancer is smoking. 4-methylnitrosamino-1-(3-pyridyl)-1-butanone (NNK) is a tobacco specific nitrosamine that induces lung tumors in a variety of animal models. It is believed to play an important role in the induction of lung cancer among smokers. In order to exert its carcinogenic effects NNK must be metabolically activated to intermediates that bind to DNA. This activation is primarily mediated thru phase I metabolism by cytochrome P450(s). Phenethyl isothiocyanate (PEITC), a component of cruciferous vegetables, inhibits cytochrome P450(s) that activate NNK. It is unclear, however, as to specifically which P450(s) are inhibited by PEITC. To determine what specific cytochrome P450(s) are inhibited by PEITC, a PEITC affinity column is being prepared. The synthesis of a phenolic PEITC derivative was performed and this compound will then be attached to the affinity resin. The results of the synthesis will be presented. (134)

**Steele, Michael\*, Amy McEuen and William Terzaghi**, Department of Biology, Wilkes University, Wilkes-Barre, PA 18766; **Edmund Stiles**, Department of Biological Sciences, Rutgers University, Piscataway, NJ; **Peter Smallwood**, University of Richmond, Richmond, VA 23173. *The Adaptive Significance of Chemical Gradients in Acorns.* — Previously, we demonstrated that many red oak species exhibit tannin gradients, with higher levels of phenolics in the apical half of the acorn, around the embryo. We also reported that five species of seed predators selectively consume the basal portion of several species of red oaks, and that the remaining apical halves often still germinate. Here, we tested acorns of three species of oak (*Quercus rubra*, *Q. palustris*, *Q. alba*) for evidence of other chemical gradients and the probability of seedling establishment of these partially consumed acorns in outdoor plots. We observed significantly higher levels of lipids and Na in the basal portion of these acorns and a low but consistent frequency of establishment (10%) of these partially eaten seeds. We suggest that these gradients, coupled with a reverse tannin gradient, direct predation away from the apical end of the acorn thereby increasing the probability of germination and establishment. (161)

**Stein, Carol M.\* and Lawrence Quarino**, Department of Chemical and Physical Sciences, Cedar Crest College, Allentown, PA 18104; **Barbara Rowley**, Pennsylvania State Police Crime Laboratory (retired), Bethlehem, PA. *Qualitative Spot Test for the Detection of EDTA in Bloodstains.* — In crime scene investigations, the question of evidence tampering may arise with respect to bloodstains. Ethylenediaminetetraacetic acid (EDTA) is used as an anticoagulant in blood samples collected by phlebotomy, and such samples are potential sources for spurious stains. A spot test, based on lanthanide-sensitized luminescence, was developed to detect the presence of EDTA in bloodstains. Extracts from EDTA-containing bloodstains produced visible fluorescence when illuminated with long-wavelength ultraviolet light. The effects of environmental factors on the spot test were examined. Human bloodstains prepared on wood, painted wood, and cement were placed in humidity chambers at room temperature and in incubators at 2–5°C, 25°C, and 37°C. Other samples were exposed to sunlight under glass breakers. Samples were extracted and tested twenty-four hours, one week, and every two weeks for six weeks under these conditions. Results show that environmental factors have no detrimental effect. (119)

**Stillman, Debra\*, Teresa Genna, James Hunsinger, Amy McEuen, Emily Sheston, Michael Steele and William Terzaghi**, Department Biology, Wilkes University, Wilkes-Barre, PA 18766; **John Carlson, Holly Marking and Richard Meisel**, School of Forest Resources, Pennsylvania State University, University Park, PA 16802; **Peter Smallwood**, Department Biology, University of Richmond, Richmond, VA. *Measuring Pollen Flow in Native Oak Forests by DNA Fingerprinting.* — We wished to measure the distance

from the pollen parent to the mother tree in native oak forests. To do so we have collected DNA samples from all 388 adult oak trees found in a 100 by 200 m transect at Hawk Mountain Nature Preserve in SE Pennsylvania. We then collected at least 20 acorns from a red oak (*Quercus rubra*) and a chestnut oak (*Q. prinus*) at each corner of the transect and from the center (5 trees of each species total). We are now extracting DNA from the embryo and cotyledons of each acorn. We will next determine the DNA fingerprint of each acorn using ten primer pairs that detect polymorphic STRs. We will then attempt identifying the pollen parent by seeing whether the non-maternal alleles match any tree within the transect (assuming that alleles which do not match the mother tree must have come from the father). (118)

**Stoneroad, Jill\* and Jane F. Cavender**, Department of Biology Elizabethtown College, Elizabethtown, PA 17022. *Grey Horses as A Potential Model for Metastatic Melanoma.* — Immunotherapeutic treatments are studied primarily in murine models; however, these models are not optimal because mice do not spontaneously develop metastatic melanoma. Gray horses develop metastatic melanoma similar to humans; therefore, this is a potential model for immunotherapeutic treatments. A study injecting hIL-12 plasmid into horse melanoma tumors met with great success. Every tumor injected with hIL-12 DNA either regressed or completely disappeared with no recurrence at four months. Our study aims to extend the data in this area and track the long-term effects. Tumors in the perianal area of a gray horse have been measured two tumors have been injected with 250 ul (250µg) of pHIL-12, two tumors were injected with 250µl of PBS and the one tumor remained untreated. Injections occurred on days 1, 3, and 5 of a 30-day treatment cycle, and tumor measurements are taken daily. This regiment will continue for 2–30-day cycles and tumor growth or regression will be monitored for an 18-month period. (94)

**Swartzentruber, Beth A.\* and Terry L. Master**, Department of Biology, East Stroudsburg University, East Stroudsburg, PA 18301. *Habitat Use of Blue-headed Vireos.* — The Eastern Hemlock (*Tsuga canadensis*) has been declining over the past 10 years as a result of infestation by the Hemlock Woolly Adelgid (*Adelges tsugae*). Little is known about what effect the loss of the trees will have on wildlife. In Pennsylvania several species of birds appear to be locally dependent upon hemlocks. Recent studies indicate that the Blue-headed Vireo (*Vireo solitarius*) is one of these species. Surveys of this species were conducted using Emlen transects to assess degree of dependence on hemlocks and habitat use patterns in impacted vs. non-impacted hemlock ravines. Results suggest that Blue-headed Vireos occurred more frequently in ravines that were not impacted by Woolly Adelgid. The birds also occurred more often in the hemlock stands rather than the surrounding hardwood forest. (4)

**Tarutis, William J., Jr.\***, Mathematics & Science Division, Lackawanna College, Scranton, PA 18509. *Digital False-color Infrared Imaging of Vegetation on Culm Banks.* — Refuse piles from abandoned coal mines (culm banks) consist of nutrient-poor pyritic shales and coal spoil material and typically support poorly developed, sparse vegetation of low diversity. In the anthracite region of northeastern Pennsylvania, these sites are dominated by gray birch (*Betula populifolia*), an early successional species that tolerates the acidic, low moisture conditions and high temperatures characteristic of the black spoil material. The effects of environmental stress on vegetation may not be visible to the naked eye, but can be detected in the near-infrared region of the spectrum (700–1200 nm) because of changes in leaf infrared reflectivity. To this end, a digital camera sensitive to the near-infrared and equipped with a visibly opaque filter (#87) to absorb visible light was used to photograph gray birch trees growing on a culm bank from June–October 2002. False-color infrared images were obtained by splitting the RGB color channels of unfiltered and infrared digital photos, recombining select channels using Adobe Photoshop, and then analyzing for (infra)red color variations with time in relation to temperature and precipitation using the Lab color model. Color variations between individual trees were observed, but no clear trends with time or with temperature and precipitation were detected, probably due to insufficient environmental stressors. Nevertheless, this digital infrared remote sensing technique appears to have promise as a relatively simple and inexpensive tool for the detection of perhaps more severe environmental stresses on vegetation. (34)

**Taylor, Abraham\* and Matthew Persons**, Department of Biology, Susquehanna University, Selinsgrove, PA 17870. *The Effect of Predation Risk on Male Courtship and Copulatory Behavior in the Wolf Spider *Pardosa milvina*.* — The wolf spider, *Pardosa milvina*, displays a variety of anti-predator responses in the presence of chemical cues (silk and excreta) from a larger wolf spider, *Hogna helluo*; however, the effect of these cues on copulation intensity and reproductive success remains unstudied. We examined the influence of substratum-borne predator chemical cues on male *P. milvina* courtship displays, mating success and copulatory behavior. Forty pairs of adult virgin male and female *P. milvina* experienced one of two substrates: 1) a sheet of filter paper previously occupied by an adult female *P. milvina* for 24 hours followed by an adult female *H. helluo* for 24 hours or 2) a control sheet of paper occupied by only an adult female *P. milvina* for 24 hours. Using behavioral observation software, we recorded courtship latency, duration, and intensity. We also measured the total number of matings, and copulatory behaviors including duration of each mating, palpal insertion counts and rates, and the number of failed insertion attempts. For each pair of test subjects, we also recorded age, size, and spider mass. Preliminary results indicate that, under predation risk, latency to

court increases, courtship intensity decreases, and copulation intensity decreases. (168)

**Tichy, Elisia D.\* and Marianne E. Staretz**, Department of Chemistry, Cedar Crest College, Allentown, PA 18104. *Interaction of Selenium Compounds with Microtubule Protein*. — Selenium compounds have been found to induce apoptosis in tumor cells. The mechanisms associated with these compounds, however, are still largely unknown. Previous research in our lab has shown that these compounds interact with microtubule protein, which may be a mechanism by which these compounds induce apoptosis. Specifically, the selenium compounds tested in the past include: sodium selenite, seleno-L-methionine, and Se-(methyl)-selenocysteine and all were shown to be potent inhibitors of microtubule polymerization. In the current study, P-XSC, a synthetic organoselenium, was tested. Several trials at different concentrations have shown that P-XSC is also an inhibitor of microtubule polymerization. It is unclear as to the nature of the organoselenium - microtubule protein interaction. To probe the interaction, we have performed an Ellman assay to determine if there is binding between sulfhydryl groups on the protein and the selenium agents. These results will also be presented. (136)

**Tobelman, Page\*, Josh C. Snyder, Fred J. Brenner and Durwood B. Ray**, Department of Biology, Grove City College, Grove City, PA 16127. *Sequencing Mitochondrial Control Region For Use as A Genetic Marker in Geese*. — The d-loop (control region) of mitochondrial DNA is highly variable. As such, it is useful as a genetic marker for species identification. Mitochondrial DNA was isolated from liver tissue obtained from Canada geese (*Branta canadensis*) and brant (*Branta bernicla*). Canada geese were obtained from Manitoba, Canada, northwestern and southeastern Pennsylvania. Brant was obtained from the Chesapeake Bay in Virginia. Chicken primers effective on the goose mtDNA d-loop were used on both the Canada goose and the brant. The PCR products of these primers were sequenced, and polymorphisms were discovered in both the brant and goose d-loop. Studies are currently focused on isolating and sequencing additional regions of the d-loop. Also, the d-loops of several other geese are being sequenced. With the sequencing of the control region, it will be possible to compare the genome between species and between geographic subpopulations. (20)

**Tothero, Daniel W.\* and Neil M. Shea**, Kutztown University, Kutztown, PA 19530. *Using a Flight Simulator to Determine the Power Curve for a Small Airplane*. — The power P developed by the engine of a small airplane in level flight with a constant airspeed v is given by  $P = A/v + Pv^3$ , where A and B are constants determined by the design of the airplane and the density of the air. The values of the constants A and B can be determined by flying the airplane at several different speeds for known power outputs and fitting

the data to a graph of  $Pv$  vs  $v^4$ . Instead of a real airplane, a computer flight simulator was used to obtain data. This was done for a Cessna 150 and for a Cessna 182. The graphs of  $Pv$  vs  $v^4$  were plotted for each plane and the results are:  $A = 3.87 \times 10^5 \text{ Nm}^2/\text{s}^2$  and  $B = 0.399 \text{ N s}^2/\text{m}^2$  for the C 150 and  $A = 1.00 \times 10^6 \text{ Nm}^2/\text{s}^2$  and  $B = 0.389 \text{ N s}^2/\text{m}^2$  for the C 182. These are in good agreement with information estimated from the POH of each aircraft. (29)

**Tripp, Erin A. \*, Ann F. Rhoads, Lucinda A. McDade and Timothy A. Block**, Morris Arboretum of the University of Pennsylvania, Department of Botany, Philadelphia, PA 19118. *Genetic Diversity and the Current Status of Ruellia (Acanthaceae) in Pennsylvania: Two Endangered/Threatened Species*. — The periodic re-evaluation of endangered species is a worthwhile practice and an essential component of maintaining the credibility of federal and state endangered species programs. *Ruellia humilis* and *Ruellia strepens* (Acanthaceae) are listed as endangered and threatened plants by the Pennsylvania Natural Diversity Inventory. Because they occur at only a few localities in Pennsylvania at their northeastern limit of distribution, genetic diversity of these species may be constrained. Additionally, population viability may be of concern due to external pressures such as habitat fragmentation or degradation. The following hypotheses were tested: genetic diversity is positively correlated with 1) population size and 2) extent of spatial distribution. Allozyme analyses were performed to calculate the percentage of polymorphic loci (P), heterozygote frequency (H), and alleles per locus (A) within populations. Genetic distance between populations was tested via Nei's G<sub>st</sub> test. Based on experimental and observational data, the current status of *Ruellia* in Pennsylvania is redefined from both a biological and conservation standpoint. (81)

**Underkoffler, Danielle M.\* and Diane M. Bridge**, Department of Biology, Elizabethtown College, Elizabethtown, PA 17022; **Daniel E. Martinez**, Pomona College, Claremont, CA. *Investigating the Role of Emx Family Homeobox Genes in the Development of the Cnidarian Podocoryna carnea*. — Life cycles of many members of the invertebrate phylum Cnidaria include two stages, the polyp and the medusa, with very different morphologies. It is not clear how the development of one stage has been evolutionarily modified to produce the other. To begin addressing this question, we have cloned Emx-type homeobox genes from *Podocoryna carnea*, which has both a polyp and a medusa stage. By examining Emx expression in *P. carnea*, we hope to test the hypothesis that the mouth and tentacle-bearing region are specified by the same set of genes in both stages, although those structures occupy different relative positions in the mature polyp and medusa. Using PCR with degenerate primers, followed by splinkerette PCR walking, we have isolated most of the coding portion of two *P. carnea* Emx genes. These genes appear to be the result of gene duplication

within the phylum. Characterization of their expression is in progress. (50)

**VanMetter, Jill\* and M. Dana Harriger**, Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201; **Rosina Bolen**, Department of Science, Mount St. Mary's College, Emmitsburg, MD 21727. *Environmental Enrichment for Sumatran Tigers in Zoos via Stimulus Objects*. — Zoos conduct enrichment to compensate for reduced complexity of captive environments. Enrichment structures the environment to increase the frequency of species specific behaviors and to improve the health of captive animals. Enrichment with four stimulus objects was conducted at the National Zoological Park with four Sumatran tigers. Control, enrichment, and post enrichment trials (30 minutes each) were conducted in two-day sessions over 12 weeks. Behavioral states were recorded with 30 second interval sampling, while discrete and object directed behaviors were recorded with 1-0 sampling. Behavioral diversity indices (BDIs) were calculated using the Shannon Diversity Index. ANOVA was performed to determine the effect of subject, trial type, and object on BDIs. Overall, subject differences were significant. BDIs increased in enrichment relative to control sessions. Post-enrichment BDIs were not different from control BDIs. These results suggest an increase in frequency of enrichment, and that enrichment should be designed on an individual basis. (43)

**Varma, Madan\***, Department of Physical Sciences, Kutztown University, Kutztown, PA 19530. *Similarity and Differences between Intraplate and Interplate Volcanoes*. — Intraplate volcanoes occur inside the tectonic plates at hotspots whereas interplate volcanoes at the junction/edges of the tectonic plates. Magma from intraplate volcanoes flows smoothly and relatively peacefully while the magma from interplate volcanoes blasts violently and does devastation over wide areas. This paper discusses the similarities and differences in the chemical and mineral makeup of the two magmas, their variation in temperature, viscosity, water and gas content. The intraplate magma is mostly silicic, highly viscous, having high concentration of gases especially sulfur dioxide. (24)

**Varmini, Behzad\* and Jane F. Cavender**, Department of Biology, Elizabethtown College, Elizabethtown, PA 17022. *Inducible Promoter Activity in Various Cell Lines*. — Cell lines with inducible promoters can be created to tightly regulate the expression of a specific gene product. Our lab has shown that cell lines containing the glucocorticoid inducible MMTV promoter proved to be leaky, as cells expressed basal levels of simian virus 40 (SV40) T-antigen without addition of dexamethazone. Thus, in an attempt to create a tighter expression system, T-antigen sequences have been cloned into the TetOn inducible vector (Clontek). Prior to creating stable cell lines, a TetOn luciferase reporter construct is being used to assess the "leakiness" of the promot-

er in various cell with and without doxycycline induction. HDF (human diploid fibroblast), NIH3T3 (mouse fibroblasts), and TC7 (monkey kidney fibroblasts) are presently being used so as to make a direct comparison to the MMTV system. After an appropriate cell line is discovered the T-antigen inducible construct will be stably integrated to begin studies on the re-activation of silenced ribosomal gene promoters. (44)

**Vastine, Julie D.\*, Amy E. Witter, and Candie C. Wilderman**, Dickinson College, Carlisle, PA 17013. *Measurement of Triclosan and Butylated Hydroxytoluene in the Carlisle, PA Regional Water Pollution Control Facility*. — The objective of this study was to investigate the occurrence and fate of two organic wastewater contaminants in the Carlisle, PA Regional Water Pollution Control Facility. The targeted analytes were triclosan (TCS: 5-chloro-2-[2,4-dichlorophenoxy] - phenol), an antimicrobial agent used in a variety of household and personal care products; and butylated hydroxytoluene (BHT: 2,6-Bis (1,1-dimethylethyl)-4-methylphenol), a common antioxidant in rubber and petroleum products and in many fat-containing foods. The objective was accomplished by monitoring TCS and BHT concentrations in the water and sludge stages of the wastewater treatment process. The analytes were extracted from wastewater using a C<sub>18</sub> solid-phase extraction column and from sludge using a strong-base extraction. Once the analytes were isolated, they were derivatized to form trimethylsilyl ethers before quantification by gas chromatography-mass spectrometry (GC/MS). BHT and TCS wastewater concentrations were below the detection limit of the GC/MS; however, there was occurrence of BHT and TCS in the sludge samples. Analysis of these results suggest that TCS biodegrades to levels below the detection limit of the GC/MS throughout the treatment process and BHT, due to its high concentrations, is being partially eliminated from the sludge but is found in the final sludge stage. (181)

**Walsh, Erica\* and Jeffrey D. Newman**, Department of Biology, Lycoming College, Williamsport, PA 17701. *Expression of Staphylococcus aureus purS in E. coli*. — My research project is to express and purify the protein encoded by *Staphylococcus aureus* purS. This gene has been cloned into pET29 and I am currently doing small scale induction of the gene. This was done by the addition of IPTG, and then samples were taken at three and eight hours. The samples were then separated into soluble and insoluble proteins. I then analyzed the samples by SDS-PAGE to determine whether my protein is being expressed. My goal at this point is to express a soluble form of my protein. I have found bands at the place where my protein is supposed to be but they are in the insoluble fraction. The predominant bands on the gel though are larger than expected. Once I have expressed *S. aureus* purS in a small scale induction, I will perform a large scale induction and then purify the protein. (57)

**Weatherill, Mandy\*** and **Wendy L. Ryan**, Department of Biology, Kutztown University, Kutztown, PA 19530. *Gas Bubble Disease in Developing Japanese Medaka (Oryzias latipes)*. — Numerous studies have been conducted on gas bubble trauma in adult and juvenile fishes. This study takes a different approach to assess the effects of gas supersaturation and gas trauma on fish embryos, which have been minimally studied. The current study focused on carefully monitoring temperature within the experimental tank and quantifying developmental abnormalities. Dissolved oxygen and temperature were measured on a daily basis, in addition to the examination of embryos and fry for developmental stage and the presence or absence of abnormalities. The control group was exposed to conditions less than or equal to 100% saturation, whereas the experimental group was exposed to gas supersaturating conditions throughout the study. The experimental group had higher heart rates than the control group, while physical abnormalities (fin and swim bladder damage) were observed in both groups. No significant differences in the rate of development or the presence of abnormalities were documented. (122)

**Weber, Nick\*** and **James Sidie**, Department of Biology, Ursinus College, Collegeville, PA 19426. *Albumin Inhibits the Anesthetic Effect of Alkyl Alcohols*. — Alkyl alcohols (1-heptanol - 1-dodecanol) at low concentration (10-5M - 10-4M) rapidly and reversibly block CNS activity. Albumin is the most abundant vertebrate plasma protein with a typical concentration of 5gm/100 ml plasma. Historically, albumin was identified as an important agent in the binding of pharmacological compounds. We investigated the inhibition of alkyl alcohol anesthesia by bovine serum albumin (BSA) at equimolar concentrations. Utilizing a weakly electric fish model (*Eigenmannia virescens* - Transparent Knife Fish), we measured the electric organ discharge frequency decrement as a function of alcohol alone and alcohol in the presence of equimolar BSA. Nonanol (C9) alone (10-4M) produces 44% EOD frequency depression; C9 and 10-4M BSA yields 20% EOD frequency depression. Decanol (C10) alone (5x10-5M) gives 24% EODf depression; C10 and 5x10-5M BSA produces 10% EODf depression. Undecanol (C11) alone (5x10-5M) gives 32% EODf depression; C11 and 5x10-5M BSA results in 9% EODf depression. The presence of BSA in the bathing solution delays the onset and kinetics of anesthetic action. We conclude that BSA effectively interferes with the anesthetic action of alkyl alcohols at equimolar concentrations. A certain fraction of the alcohol in the bathing solution may be bound by the BSA. Supported in part by HHMI/Ursinus Summer Research Program. (105)

**Welte, Nevin T.\*** and **Erik A. Weber**, Department of Biology, Mercyhurst College, Erie, PA 16546. *The Effects of Phragmites Control Efforts on Unionid and Benthic Macroinvertebrate Populations of a Nearshore Area of Thompson Bay, Presque Isle, Erie, PA*. — This study was designed to

address concerns that *Phragmites australis* control methods (cutting, burning, herbicide application) in the Gull Point area of Presque Isle could be potentially resulting in the release of heavy metals into Thompson Bay. Data was collected on various dates during the summer of 2002 to assess the relationship between *Phragmites* and the unionid and benthic macroinvertebrate communities. Three sites were chosen: a site previously treated for *Phragmites* during 2000 and 2001; a site containing a dense stand of *Phragmites*, and a site with no *Phragmites*. Transects were established for assessing unionids and other aquatic communities at 0, 5, and 10m from shore at each site. Data provided evidence that *phragmites* control work on the shore of Thompson Bay has had no demonstrable negative impact on nearby populations of unionids and benthic macroinvertebrates. (88)

**White, Jessica A.\*** and **Brian S. Misanko**, Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104; **M. Todd Miller**, Department of Surgery, Lehigh Valley Hospital and Health Network, Allentown, PA 18103. *Correlation of Head CT Characteristics with Intra-cranial Pressure*. — As elevated intracranial pressure (ICP) has been recognized as the most common cause of severe morbidity and mortality in the head injured patient, the objective is to create a predictability score for evaluating the need for a ventriculostomy to manage ICP in trauma patients. A 5-year retrospective chart review was conducted between 1997 and 2001, utilizing 160 patients who met the inclusion criteria of a GCS score of eight or less and ventriculostomy placement. Two neuroradiologists independently graded the initial head CT's on a scale of one to three for each characteristic. These individual characteristic scores were then added, yielding an overall score of five to 15. Statistical analysis of the results will show whether or not the Head CT score is directly correlated with ICP. This scoring system can be then used to develop effective treatment plans and may reduce placement of unnecessary ventriculostomies. (64)

**Whitney, Aletha\*** and **Deborah Austin**, Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201; **Ruth Welliver**, Pennsylvania Department of Agriculture, Harrisburg, PA. *Detection of Plum Pox Virus (PPV) in Herbaceous Hosts*. — Plum pox (PPV), a viral disease of stone fruit trees, has caused the destruction of over 1000 acres of orchard trees in South-Central Pennsylvania, costing \$12 million in grower compensations. Although the natural hosts of PPV are woody *Prunus* species, herbaceous plant species, including several common to Pennsylvania, have demonstrated the ability to act as viral hosts in laboratory settings. Detection of possible PPV infections in herbaceous hosts in situ is an important aspect of monitoring virus spread and evolution. Samples of herbaceous species were gathered from two sites identified as PPV-positive by the USDA/PDA Plum Pox Survey. Ninety samples were processed using DAS ELISA. No PPV was detected in the collected samples. Lack of PPV detection cannot be con-

sidered conclusive evidence, however, for the absence of PPV in herbaceous populations. Several factors, including low virus titers and viral coat mutations, may invalidate ELISA results. (62)

**Williams, Christine\***, **Skye Harris** and **Nancy Waters**, Department of Biology, Lafayette College, Easton, PA 18042. *Mercury resistant bacteria: A Study of the Molecular Mechanism for Toxicity Resistance and Macrophyte Associations*. — Our laboratory is examining existing biota survival in mercury contaminated systems. Mercury resistant (HgR) bacteria were recovered in situ from sediments, water, and macrophytes. Macrophytes harboring HgR bacteria experimentally demonstrate ten-fold lower mercury concentrations than those lacking HgR bacteria, due to possession of the mer operon, which is responsible for reducing mercury toxicity. To examine this association experimentally, a series of five microcosms were established with a graded sediment mixture ranging in both mercury content and HgR bacteria abundance; aquaria were filled with spring water, and planted with macrophyte tubers. HgR bacteria frequency and distribution were determined weekly on water, sediment, and macrophytes samples. Preliminary results demonstrate macrophyte tissues selectively concentrate HgR bacteria reflective of the graded mercury concentration. Comparison of HgR bacteria abundance to environmental mercury concentrations and accessory genes within the mer operon suggests that biota can actively acquire HgR bacteria to improve their survival in contaminated habitats. (32)

**Williams, Lee\*** and **Laurie Caslake**, Department of Biology, Lafayette College, Easton, PA 18042. *Organic Mercury Resistance is Variable and Widespread in Bacterial Isolates from Onondaga Lake*. — Mercury resistance is regulated by the presence of the mer operon in many different types of bacteria. Resistance to organic mercury such as phenylmercuric acetate (PMA) is associated with the presence of merB, encoding organomercurial lyase. In intestinal flora, PMA resistance is associated with a small subset of merA sequence variants. In Onondaga Lake (Syracuse NY), a high proportion of mercury is in the organic methyl-mercury form. Bacterial samples collected from Onondaga Lake were screened for the presence of merB; 59% of isolates were resistant to PMA compared to 35% in intestinal flora. PCR using primers designed to amplify the region usually containing merB (between merA and merD) shows that merB may be present in this position in 3 of the PMA-resistant samples. In conclusion, merB is a variable gene and is associated with additional merA loci patterns in Onondaga Lake. (49)

**Williams, Windy S.\***, **Marie E. Maradeo\*** and **Margaret T. Peeler**, Department of Biology, Susquehanna University, Selinsgrove, PA 17870. *A Possible Role for Semaphorin Guidance Cues in Sea Urchin Primary Mesenchyme Cell Migration*. — Sea urchin primary mesenchyme cells

(PMCs) form the larval calcium carbonate skeleton. Prior to skeletal synthesis, these cells migrate throughout the embryonic blastocoel and settle into ventrolateral clusters, a process which appears to involve migration signals and cues which have not yet been identified. A sequence with a high degree of homology to vertebrate semaphorin, a protein used in neuronal guidance systems, has been identified in the sea urchin species *Strongylocentrotus purpuratus*. Using RT-PCR based cloning, we have identified a possible homologue of this gene in the species *Lytechinus pictus*. We hypothesize that a semaphorin signal may play a role in the directed migration of PMCs. Characterization of the semaphorin expression pattern during sea urchin embryonic development is being conducted in order to determine whether the timing and spatial regulation of semaphorin expression is consistent with this hypothesis. (112)

**Wilson, Joseph J.\***, Gannett Fleming, Inc., State College, PA 16803; **Timothy J. Maret**, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Niche Partitioning and the Coexistence of Similar Species: an Evaluation of the Diet of Three Species of Ambystoma Larva*. — Three species of *Ambystoma* utilize seasonal ponds for larval development in south-central Pennsylvania. We evaluated the diet of these species of *Ambystoma* larvae to determine the extent of dietary overlap and get an understanding of niche partitioning between the species. A total 449 specimens (*A. jeffersonianum* n=192, *A. maculatum* n=157, and *A. opacum* n=150), collected from 1997–1999, were examined and stomach contents were sorted by proportion of prey type. *A. maculatum* larvae consumed the greatest amount of zooplankton (0.80 proportion of diet). *A. jeffersonianum* included a substantial proportion of vertebrate prey in their diet (0.13). *A. opacum* larvae included a large amount of insects in their diet (0.29) especially when the pond was inhabited by all three species (0.56). Dietary overlap was not as great as expected between the species. Our findings provide evidence of niche partitioning among these species and give insight into the coexistence of similar species. (1)

**Wolfgang, Valerie A.\*** and **Katherine A. Hess\*** (Matthew Persons), Department of Biology, Susquehanna University, Selinsgrove, Pennsylvania, 17870. *A Comparison of the Effect of Pulsed and Continuous Predation Risk on Body Condition and Egg Production in the Wolf Spider Pardosa milvina*. — The wolf spider, *Pardosa milvina*, shows a variety of antipredator responses in the presence of silk and excreta from a larger predator, *Hogna helluo*. We examined the relative influence of duration of predator cue exposure and quality of predator cues on female *P. milvina* behavior, body condition, and reproductive success. We measured the frequency in which *P. milvina* females engage in antipredator behavior (vertical movement) under different predator cue exposure regimens over a 14-d period. We also recorded changes in female body condition and eggsac production.

Six experimental treatments were used ( $n = 20/\text{treatment}$ ): 1) constant exposure to peat moss previously exposed to an adult female *Hogna* for three days, 2) as in treatment 1, except the substrate was renewed every three days, and 3) exposure to *Hogna* cues every two days followed by two days without predator cues. For each of the three predator exposure regimens, we had three corresponding treatments without predator cues to control for the effects of disturbance and measurement. Preliminary results suggest that egg production does not significantly vary between treatments, although reductions in abdomen size are greater in the predator cue treatments and *P. milvina* shows increased vertical movement in predator treatments. (169)

**Wolgemuth, Jessica\*, Kelly Smith\* and Marcie L. Baer**, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Bacterial Acquisition of Resistance to Antibiotics*. — Despite early success in using antibiotics to treat infectious diseases, abuse and over prescription has resulted in an increase in microbial resistance. The purpose of this study was to determine if commonly available antibacterial products promote resistance in normal skin flora. Volunteers (25) were screened using a disk diffusion assay to determine a baseline of microbial resistance to eight antibiotics. Following the initial screening, 12 volunteers used an antibacterial product on a daily basis and 13 people served as controls. Participants were screened over a 5 week period and changes in resistance were recorded. Results demonstrated that 75% of product users had an increase in the number of resistant strains inhabiting the skin. Alternatively, 83% of the controls showed no change or a decrease in the number of resistant strains on their skin. A decrease in resistance was observed for 2 volunteers of the product-using group who used antibacterial soap products, suggesting that the amount of time the product remains in contact with the skin is an important factor in the acquisition of resistance. (137)

**Wood, Michelle A.\*, Thomas O'Brien and Jane F. Caverder**, Department of Biology, Elizabethtown College, Elizabethtown, PA 17022. *Onset of Cellular Senescence and the Rate of Infectability of Rat Embryo Fibroblasts*. — The exact function of and mechanisms that initiate senescence are largely unknown. It is clear that cells are unable to reenter the cell cycle and no longer take up DNA. Senescence may act as a barrier to mutational diseases or tumor formation; and, the potential of reversing senescence could lead to treatments in cancer and biomedical research. The experiments proposed will determine the infectability of primary rat embryo fibroblasts (REF) cells through transduction with *Baculovirus* containing the lacZ gene (BacBlue). The efficiency of infectability will be compared with the natural rate of senescence. We have found that REF cells begin to senesce by approximately passage 10 as detected by senescence associated B-galactosidase. The population of senescent cells is approximately 2 percent. If the cells are found to be

infectable after the onset of senescence, then a tool for the study of senescent mechanisms may have been found. (46)

**Xanthopoulos, Julie M.\*, Farahleena S. Laiwalla and Shyamal K. Majumdar**, Department of Biology, Lafayette College, Easton, PA 18042. *Growth Inhibitory Response of Mouse Mammary Carcinoma Cells to Anastrozole*. — Anastrozole is an effective anti-breast cancer drug that is being used to combat estrogen receptor positive mammary cancer cell growth. The drug inhibits aromatase, an enzyme essential to estrogen synthesis in post-menopausal women. In this study, the 4T1 murine mammary carcinoma cells were treated with anastrozole to observe the drug's effect in vitro. Cell kinetic studies and a cell proliferation assay were performed with several concentrations of anastrozole over the duration of 120 hours. Additionally, surface ultrastructural effects of the drug were investigated using a Scanning Electron Microscope (SEM). The cell kinetics study revealed that 4T1 cell proliferation was affected adversely at 30 and 50  $\mu\text{g/ml}$  concentrations, the latter being the more effective. The 50  $\mu\text{g/ml}$  concentration tested in the cell proliferation assay demonstrated statistically significant differences in cell mortality in the treated cultures compared to the control groups. The anastrozole treated cells also exhibited increased cell surface damages, characteristic of both apoptosis and necrosis when viewed under the SEM. (14)

**Yates, Marla\* and Jeffrey D. Newman**, Department of Biology, Lycoming College, Williamsport, PA 17701. *Expression of Human FGAR Amidotransferase in E. coli*. — In order to stop proliferation of *Staphylococcus aureus*, a human pathogen, this research lab aims to exploit the species-specific structural differences in N-formylglycinamide ribonucleotide (FGAR) amidotransferase allowing for selective inhibition of purine biosynthesis in *S. aureus*. This research will focus on the expression and purification of *H. sapiens* FGAR amidotransferase, the control enzyme for subsequent pharmacological studies. The *H. sapiens* FGAR amidotransferase gene was cloned into the Novagen pET15b expression vector; restriction enzyme digestion confirmed the ligation. SDS-PAGE analysis revealed less than optimal expression of the *H. sapiens* gene in initially transformed bacterial strains, probably due to species-specific codon preferences. Therefore, the clone was transformed into an *E. coli* strain engineered with *H. sapiens* tRNAs. Currently, IPTG-induced expression experiments are being performed; it is anticipated that target gene expression will result. Using fusion tag technology, subsequent FGAR amidotransferase purification will be performed. (13)

**Yost, Julianne M.\* and Paul M. Sherblom**, Department of Chemical and Physical Sciences, Cedar Crest College, Allentown, PA 18104. *Organic Synthesis of Pradimicin A - a Potent Mannan-binding Antifungal Agent*. — Opportunistic fungal infections, such as Candidiasis and Aspergillosis, are responsible for an increased mortality among AIDS and

other immunocompromised patients. Present antifungal therapies, consisting primarily of amphotericin B and the azoles, lack selective toxicity and have severe side effects. New antifungal agents, the pradimicins, inhibit the synthesis of the fungal cell wall carbohydrate polymer, mannan, but are only available from natural sources. Our work attempts to develop a synthetic route for pradimicin A, possessing a core structure of glycosylated dihydrobenzo[a]naphthacenequinone substituted with D-alanine. A synthetic route was devised utilizing 1,5-diaminoanthraquinone and 2-methyl-6-nitrobenzoic acid as starting materials. The seventeen-step synthesis converts the 1,5-diamines to 1,5-dinitros, adds functional groups to each aromatic precursor, merges the two ring systems into the 5 ring aromatic system of pradimicin A, and afterward modifies the nitro groups to hydroxyls present in the natural product. We are currently implementing and improving this synthesis. (21)

**Zambo, Jamie M.\* and Timothy J. Maret**, Department of Biology, Shippensburg University, Shippensburg, PA 17257. *Direct and Indirect Effects of Acidification on Amphibians and their Invertebrate Predators*. — Many studies have been done on the direct effects of acidity on amphibians, but little research has been conducted on the indirect effects of acidity on the interactions between amphibians and their predators. This study examined the effects of pH on the hatching success, hatching size, and hatching time of wood frogs (*Rana sylvatica*) and green frogs (*R. clamitans*) as well as the effects of pH on predation on different sizes of *R. sylvatica*, *R. clamitans*, and American toad (*Bufo americanus*) tadpoles by dragonfly naiads (families Cordullidae and Aeshnidae). The percentage of eggs that hatched and the time it took them to hatch was significantly influenced by pH for *R. clamitans*, but not *R. sylvatica*. Size of tadpoles at hatching was not significantly affected by pH for either species. The percentage of tadpoles attacked was dependent on the size of the tadpole for *R. sylvatica* only and was not significantly influenced by pH for any species. (5)

**Zimmerman, Mel\***, Department of Biology, Lycoming College, Williamsport, PA 17701. *Response to Fish Populations to Natural Stream Channel Design Restoration Along Big Bear Creek*. — In order to stabilize the streams banks against erosion and improve habitat for aquatic life, the Dunwoody Club and partners have developed a stream restoration project for the Big Bear Creek, Lycoming County, PA. Restoration, utilized Rosgen-style fluvial geomorphology, was used to construct 127 structures throughout a 3.8 mile stretch of stream in order to stabilize banks and improve habitat for aquatic life. This study will attempt to illustrate how the restoration of the past four years has affected fish populations of the stream. Fish population estimates (using electroshocking and snorkeling) were made at ten sites along the stream including areas restored above and below these sites. Trout samples were weighed, measured, aged and tagged. In addition, some trout were used for gut content analysis to determine the feeding habits of the population. The study will summarize the initial effects the stream restoration has had on the fish populations as well as determining trends to the future fishery. (38)

† The abstracts published herein have not been subjected to editorial scrutiny.

\* Author presenting the paper.

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## REVIEWERS FOR VOLUME 76, 2002

More than anyone else, the Reviewers must be credited with assessing and increasing the quality of the papers published in the *Journal*. I acknowledge and extend my sincerest appreciation on behalf of the Academy to all those listed below. With almost every manuscript, referees gave freely of their time and offered useful and courteous comments to authors. I also acknowledge the assistance of the associate editors. I further thank and acknowledge the Department of Biology, Lafayette College, for the space, materials and support.

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S. K. Majumdar  
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