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*PAS Home Page: <http://pennsci.org>*

*87<sup>th</sup> Annual Meeting*  
*of the*  
**Pennsylvania Academy of Science**

April 1-3, 2011

*Penn State University Altoona*  
*Altoona, PA*

<b>SCHEDULE OF ACTIVITIES AT A GLANCE</b>	<b>191</b>
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## **SCHEDULE OF ACTIVITIES AT A GLANCE**

### ***87<sup>th</sup> Annual Meeting of the Pennsylvania Academy of Science***

March 30 – April 1, 2012  
Cedar Crest College • Allentown, PA

#### *Friday, April 1*

1:00–4:00 PM	Field Trip to Gamesa and Wind Farm	Ebensburg, PA
5:00-6:30	PM Dinner and PAS Board Meeting	PSU-Altoona Dining Hall
5:00-6:30	PM PATWS Board Meeting	Hawthorn 145
6:30-7:30 PM	Meeting Check-In	Railroaders Memorial Museum
7:00–9:00 PM	Reception	Railroaders Memorial Museum

#### *Saturday, April 2*

7:30–10:30 AM	Meeting Check-In	Hawthorn
8:30–10:30 AM	Symposium: Global Climate Change	Hawthorn 150
8:30-11:30 AM	Oral Presentations	
	I Cancer Biology	Hawthorn 138
	II Chemistry of Life	Hawthorn 139
9:00–4:00 PM	Exhibits	Hawthorn
10:00–12 noon	Poster Session I: Aquatic Ecology (Poster set-up 8:00-10:00 AM)	Hawthorn 134/148
10:00-12 noon	Wildlife Leadership Academy Posters	Hawthorn
10:30–10:45 AM	Coffee Break and Poster Browsing	
11:30–1:00 PM	Lunch	PSU-Altoona Dining Hall

12:00-1:00 PM	PAS Business Meeting	Hawthorn 145
1:00-4:00 PM	Oral Presentations	
	III Cell Biology	Hawthorn 150
	IV Bird and Reptile Conservation	Hawthorn 138
	V Plant Ecology followed by Science Education	Hawthorn 139
2:00-4:00 PM	Poster Session II: Ecology and the Environment (Poster set-up 12:00-2:00 PM)	Hawthorn 134/148
2:30-2:45 PM	Coffee Break and Poster Browsing	
4:15-5:15 PM	Plenary: Dr. Michael Mann	Adler Gym
5:15-6:00 PM	Meet and Greet with Dr. Michael Mann and Raffle	Adler Gym
6:00 PM	Dinner	Adler Gym

### Sunday, April 3

7:30-8:30 AM	Meeting Check-In	Hawthorn
8:30-11:30 AM	Teacher's Workshop : Climate Change and Renewable Energy	Hawthorn 146
8:30-11:30 AM	Oral Presentations	
	VI Aquatic Biology	Hawthorn 150
	VII Mammalogy	Hawthorn 138
9:30-11:30 AM	Poster Session III: Cell Biology and Biochemistry (Poster set-up 8:00-9:30 AM)	Hawthorn 134/148
10:00-10:15 AM	Coffee Break and Poster Browsing	
11:30-12:30 PM	PAS Board Meeting	Hawthorn 145

## PROGRAM SESSIONS

*8<sup>th</sup> Annual Meeting of the Pennsylvania Academy of Science  
Joint Meeting with the Pennsylvania Chapter of the Wildlife Society  
Penn State University Altoona, Altoona PA,*

**April 1-3, 2011**

*Program Chairs  
Sherri Bergsten and Theo Light*

**SYMPOSIUM  
SATURDAY APRIL 2  
8:30 AM – 10:30 AM  
GLOBAL CLIMATE CHANGE  
Hawthorn 150  
Mike Campbell, Session Chair**

**8:30-8:50**

1. *Adapting to climate change in Pennsylvania – a role for the Pennsylvania Academy of Science?* **Czarnecki, Greg\***. Pennsylvania Department of Conservation and Natural Resources, Harrisburg, PA.

**8:50-9:10**

2. *Is climate change precipitating a biological meltdown in the Lake Erie Basin?* **Campbell, J. Michael\***. Mercyhurst College, Erie, PA.

**9:10-9:30**

3. *A framework for evaluating risk of aquatic invasive species range expansions in a changing climate in Pennsylvania.* **Grisè, Sara N. \*** and **Theo Light**. Shippensburg University, Shippensburg, PA.

**9:30-9:50**

4. *Using ectotherm cold tolerance and overwintering physiology to predict climate change winners and losers.* **Barrett, Patrick, Vicki Bendus, Rachel Kandefer, Amber Kissman, and Michael A. Elnitsky\***. Department of Biology, Mercyhurst College, Erie, PA.

**9:50-10:10**

5. *Mapping horizontal progress of sea-level rise using vegetation communities at Assawoman Wildlife Area, Sussex County, Delaware.* **Coxe, Robert\***. Delaware Natural Heritage and Endangered Species Program, Smyrna, DE.

**10:10-10:30**

6. *Seasonal thermal energy storage.* **Flarend, Richard\*, Tim Dolney, and Jeremy Walsh**. Penn State Altoona, Altoona, PA.

**ORAL SESSION I  
SATURDAY APRIL 2  
8:30 AM – 11:30 AM  
CANCER BIOLOGY**

**Hawthorn 138  
Lucinda Elliott, Session Chair**

**8:30-8:45**

7. *SV40 large T antigen interaction with TATA-binding protein is abrogated by W94A or F98A amino acid substitutions within the pAb 416 epitope.* **Fuesler, John\*** and **Jane F Cavender**, Biology Department, Elizabethtown College, Elizabethtown, PA.

**8:45-9:00**

8. *Correlation between p53 and Rb-binding activities of SV40 T-antigen and the ability to block differentiation of pre-adipocytes.* **Pankowicz, Francis\*** and **Jane F. Cavender**. Elizabethtown College, Elizabethtown PA.

9:00-9:15

9. *Investigating the effects of EphA2/ephrin-A1 signaling on aggressive melanoma metastatic characteristics.* **Busada, Jonathan\*** and **Angela R. Hess.** Bloomsburg University, Bloomsburg PA.

9:15-9:30

10. *Analyzing new methods to measure cellular proliferation rates in human melanoma cells.* **Busada, Michael A.\*** and **Angela R. Hess.** Bloomsburg University, Bloomsburg PA.

9:30-9:45

11. *Comparative expression profiles of Eph receptors and ephrin ligands in the human keratinocytes and melanocyte.* **Pierce, Diana H.\*** and **Angela R. Hess.** Bloomsburg University Bloomsburg PA.

9:45-10:00

12. *Analysis of DAMP expression in mouse and human breast cancer.* **Kurt, Robert, Caroline Vail\***, and **Jason Ewer\*.** Lafayette College, Easton, PA.

10:00-10:15

13. *Analyzing the role TRAM plays in TLR4/LPS signaling in 4T1 murine mammary carcinoma.* **Akuffo, Afua\*, Robert Kurt, Jason Ewer,** and **Caroline Vail.** Lafayette College, Easton PA.

10:15-10:30

14. *Morphometric analysis of nuclei, lumens, and shape of lactiferous ducts in cancerous breast tissue.* **Barrieres, Kelly A.\*** and **Jennifer L. White.** East Stroudsburg University, East Stroudsburg, PA.

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

10:45-11:00

15. *Inhibition of human breast cancer cell growth in direct response to increasing doses of 1,8-(Bis) Propyl Spermidine.* **Pogash, Thomas\*, Soha Daher-Mansour, Weston Umstead, Francis Mayville,** and **Peter J. Leonard.** DeSales University, Center Valley, PA.

11:00-11:15

16. *The synthesis of four spermidine analogs as potential anticancer agents.* **Umstead, Weston\*** and **Francis C. Mayville.** DeSales University, Center Valley, PA.

**ORAL SESSION II****SATURDAY APRIL 2****8:30 AM – 10:30 AM****CHEMISTRY OF LIFE****Hawthorn 139****Amy Dieleman-Parente, Session Chair**

8:30-8:45

17. *Quantification of active hydroxyl sites on porous silica particles.* **Sposato, Laura K.\*,** and **Ronald M. Supkowski.** King's College, Wilkes-Barre, PA.

8:45-9:00

18. *The enhancement of extraction methods of PBDEs from feline serum samples with reversed-phase SPE.* **Brubaker, Erika E.\*** and **Clinton D. Jones.** Mercyhurst College, Erie, PA.

9:00-9:15

19. *Design of a biological sensor for potassium ions.* **Diegelman-Parente, Amy\*.** Mercyhurst College, Mercyhurst, PA.

9:15-9:30

20. *The use of bioinformatics to identify Marvin, a novel microbacteriophage.* **Alladin, Ambreen\*, Katie Mageeney, Dr. David Dunbar** and **Dr. Melinda Harrison.** Cabrini College, Radnor, PA.

9:30-9:45

21. *The affects of selenium on the rate of growth of Chlamydomonas reinhartii and new storage techniques.* **Shenk, Derreck\*, Sarah Rocco** and **Melinda Harrison.** Cabrini College, Radnor, PA.

**9:45-10:00**

**22.** *Wine chemistry: measuring the effects of white oak tree elevation in Ellagitannin Alcohol Absorption.* **Giaccio, Aimee\***, **Derreck Shenk** and **Melinda Harrison**. Cabrini College, Radnor, PA.

**10:00-10:15**

**23.** *Dibutyl phthalate and other pesticide residues from various tropical fruits.* **Trinh, Hoa\***, **Kishore K. Bagga**, and **Kevin Owens**. Drexel University College of Medicine, Philadelphia, PA.

**ORAL SESSION III  
SATURDAY APRIL 2**

**1:00 PM – 4:00 PM**

**CELL BIOLOGY**

**Hawthorn 150**

**André Walther, Session Chair**

**1:00-1:15**

**24.** *The efficacy of dietary supplementation of polyunsaturated fatty acids on Psoriasis in the Psoriasisform Murine Model KC-Tie2.* **Paré, Monique M \***, **Nicole Ward**, **M. Dana Harriger** and **Catherine Santai**. Wilson College, Chambersburg, PA. Case Western Reserve University, Cleveland, OH.

**1:15-1:30**

**25.** *The effects of water-soluble fiber combined with poly- and monounsaturated fatty acids on plasma lipoprotein levels in hypercholesterolemic rats.* **Khalifeh, Mariam\***, **Brad E. Engle**, and **Deborah S. Austin**. Wilson College, Chambersburg, PA.

**1:30-1:45**

**26.** *Detection of changes in mitochondrial integrity and levels of GSK-3 $\beta$  in hippocampal mitochondria of the triple transgenic mouse model of Alzheimer's Disease.* **Luan, Jing\***, **Brad E. Engle**, and **M. Dana Harriger**. Wilson College, Chambersburg, PA.

**1:45-2:00**

**27.** *The role of A-kinase anchoring proteins and Akt in Schwann cell cultures.* **Shoemaker, Erin\***, **Rick Stahl**, **David Carey**, and **Angela Asirvatham**. Misericordia University, Dallas, PA, Weis Center for Research, Geisinger Clinic, Danville, PA.

**2:00-2:15**

**28.** *Changes in mitochondrial membrane potential and reactive oxygen species production induced by pathogen-associated molecular patterns in the earthworm Eisenia hortensis.* **Nacarelli, Timothy\*** and **Sheryl L. Fuller-Espie**. Cabrini College, Radnor, PA.

**2:15-2:30**

**29.** *Using JC-1 and annexin V-FITC to assess changes in mitochondrial membrane potential and phosphatidylserine translocation as indicators of apoptosis in response to heavy metals in coelomocytes of Eisenia hortensis: A flow cytometric study of innate immunity in invertebrates.* **Bearoff, Frank M.\*** and **Sheryl L. Fuller-Espie**. Cabrini College, Radnor, PA.

**2:30-2:45 BREAK****2:45-3:00**

**30.** *Replication protein A Phosphorylation Regulates nucleotide excision repair of DNA damage caused by ultraviolet light in the budding yeast Saccharomyces cerevisiae.* **Nole, Kirsten\*** and **André Walther**. Cedar Crest College, Allentown, PA.

**3:00-3:15**

**31.** *Replication protein A Phosphorylation Regulates Cell Cycle DNA Damage Checkpoints in Saccharomyces cerevisiae.* **Klein, Sarah\***, **Sakina Khaku**, and **André P. Walther**. Cedar Crest College, Allentown, PA.

**3:15-3:30**

**32.** *Replication Protein A Phosphorylation Plays a Role in Telomere Length Maintenance in the Budding Yeast Saccharomyces cerevisiae.* **McQuilken, Molly\*** and **André P. Walther.** Cedar Crest College, Allentown, PA.

**3:30-3:45**

**33.** *Regulation of Protein-Protein Interactions by Phosphorylation of Replication Protein A in the Budding Yeast Saccharomyces cerevisiae.* **Hager, Kayla\*** and **André P. Walther.** Cedar Crest College, Allentown, PA.

**ORAL SESSION IV  
SATURDAY APRIL 2**

**1:00 PM – 4:00 PM**

**BIRD AND REPTILE CONSERVATION**

**Hawthorn 138**

**Dan Brauning, Session Chair**

**1:00-1:15**

**34.** *Pennsylvania boreal conifer forests bird challenges and opportunities.* **Gross, Douglas A.\*** Pennsylvania Game Commission, Orangeville, PA.

**1:15-1:30**

**35.** *Index of forest area-sensitive bird distribution in Pennsylvania.* **Brauning, Dan\***, **Andy Wilson, Robert Mulvihill, Mark Niessner,** and **Mike Lanzone.** Pennsylvania Game Commission, Harrisburg, PA.

**1:30-1:45**

**36.** *10 years of CREP: evaluating the benefits of the Conservation Reserve Enhancement Program on grassland/shrubland birds.* **Pabian, Sarah E.\***, and **Margaret C. Brittingham.** Pennsylvania State University, University Park, PA.

**1:45-2:00**

**37.** *Creating a BMP (best management practices) for Pennsylvania and Maryland's forestlands for the Golden-winged warbler.* **Bakermans, Marja H.\*** and **Jeffrey L. Larkin.** Indiana University of Pennsylvania, Indiana, PA.

**2:00-2:15**

**38.** *Developing and implementing habitat management prescriptions for Golden-winged warblers in North-central Pennsylvania.* **Frantz, Mack W.\***, **Joe Grata, Marja Bakermans,** and **Jeff Larkin.** Indiana University of Pennsylvania, Indiana, PA.

**2:15-2:30**

**39.** *Population status of wintering vultures in Pennsylvania.* **Bruno, Kelsey\*** and **Gregory George.** Delaware Valley College, Doylestown, PA.

**2:30-2:45 BREAK****2:45-3:00**

**40.** *The Louisiana waterthrush as a bioindicator of hemlock habitat productivity: a preliminary comparison of hemlock ravines and benches.* **Ernst, N.T.\*** and **T. Master.** East Stroudsburg University, East Stroudsburg, PA.

**3:00-3:15**

**41.** *Habitat use by grassland obligate birds in South Central Pennsylvania.* **Weber, Andrew\*, Margaret Brittingham** and **Andrew Wilson,** Pennsylvania State University, University Park, PA.

**3:15-3:30**

**42.** *Population distribution, density and habitat preferences of the Cerulean warbler, (*Dendroica cerulea*), in the Delaware Water Gap National Recreation Area.* **Curley, Shannon\*** and **Terry Master.** East Stroudsburg University, East Stroudsburg, PA.

**3:30-3:45**

43. *Habitat preferences of neotropical pitvipers in Costa Rica.* **Hoffman, Michael J.\***, and **Thomas C. LaDuke**. East Stroudsburg University, East Stroudsburg, PA.

**3:45-4:00**

44. *Understanding factors that influence the distribution of the endemic shorthead garter snake (*Thamnophis brachystoma*) in northwestern Pennsylvania.* **Mibroda, Julie E.\***, **Jeffery L. Larkin**, and **Joseph E. Duchamp**, Indiana University of Pennsylvania, Indiana, PA.

**ORAL SESSION V  
SATURDAY APRIL 2**

**1:00 PM – 4:00 PM**

**PLANT ECOLOGY AND SCIENCE  
EDUCATION  
Hawthorn 139**

**Megan Rothenberger, Session Chair**

**1:00-1:15**

45. *Foliar morphology of *Castanea dentata* subpopulations in Pennsylvania.* **Gardner, Ian\***, **Anna Jaworski**, and **Adam Fehn**. Juniata College, Huntingdon, PA.

**1:15-1:30**

46. *Tracking trends in pollination rates over time using herbarium specimens of *Asclepias syriaca* (common milkweed).* **Teresa A. Trego\***, **Tatyana Livshultz**, **Ann F. Rhoads**, and **Tim A. Block**. The Academy of Natural Sciences, Philadelphia, PA; The Morris Arboretum of the University of Pennsylvania, Philadelphia, PA.

**1:30-1:45**

47. *Pathogenicity of new clonal lineages of *Phytophthora infestans* on potato cultivars.* **Andersen, Kelsey\*** and **Manuel Ospina-Giraldo**. Lafayette College, Easton, PA.

**1:45-2:00**

48. *Exploration of the gypsy moth disturbed forest patches on College Mountain: determination of disturbance's legacy on future forest diversity and soil fertility.* **Sabo, Robert D.\***, and **Jeffrey A. Simmons**. Mount Saint Mary's University, Emmitsburg, MD.

**2:00-2:15**

49. *Distribution, decomposition rate, and phosphorus content of two exotic plant species.* **Hollander, Jeffrey\*** and **Megan Rothenberger**. Lafayette College, Easton, PA.

**2:15-2:30**

50. *Forest habitat impacts and conservation opportunities in Marcellus gas development areas.* **Johnson, Nels**, **Tamara Gagnolet\***, **Rachel Ralls**, **Scott Bearer**, The Nature Conservancy, Harrisburg, PA; **Ephraim Zimmerman**, **Brad Eichelberger**, **Chris Tracey**, Western Pennsylvania Conservancy, Pittsburgh, PA; **Ginny Kreitler**, **Stephanie Orndorff**, **Sarah Sargent**, **Jim Tomlinson**, Audubon Pennsylvania, Harrisburg, PA.

**2:30-2:45 BREAK****2:45-3:05**

51. *Extending learning beyond the classroom: creating a biology learning community in a residence hall.* **Surmacz, Cynthia\***, **Angela Hess\***, **John Hranitz**, **Clay Corbin**, **Gary Wassmer**, **Zareen Amin**, **Carl Hansen**, **Karl Henry**, **Barry Nolt**, **Steven Rier**, **Margaret Till**, **Jennifer Venditti**, and **Marianna Wood**. Bloomsburg University; Bloomsburg, PA.

**3:05-3:25**

52. *Showcasing your work: the value of science education presentations by science faculty.* **Karnas, K. Joy\*** and **Audrey J. Ettinger\***. Cedar Crest College, Allentown, PA.

**3:25-3:45**

**53.** *Two lab modules designed for a new introductory molecular and cellular biology course.* **Mylin, Lawrence\***, **Songprod Lorgunpai**, **Michele Pedersen**, **Robyn Smith**, **Brandon Neal**, and **Michael Shin**. Messiah College, Grantham, PA.

**3:45-4:00**

**54.** *An improved restriction analysis exercise for an introductory molecular and cellular biology course.* **Lorgunpai, Songprod\*** and **Lawrence Mylin**. Messiah College, Grantham, PA.

**ORAL SESSION VI****SUNDAY, APRIL 3****8:30 AM – 11:30 AM****AQUATIC BIOLOGY****Hawthorn 150****Ken Klemow, Session Chair****8:30-8:45**

**55.** *Conservation and management of crayfishes: lessons from Pennsylvania.* **Lieb, David A.<sup>1\*</sup>**, **Raymond W. Bouchard<sup>2</sup>**, **Robert F. Carline<sup>3</sup>**, **Ted R. Nuttall<sup>4</sup>**, **John R. Wallace<sup>5</sup>**, and **Carrie L. Burkholder<sup>6</sup>**. <sup>1</sup>Pennsylvania Fish & Boat Commission/Western Pennsylvania Conservancy, Bellefonte, PA; <sup>2</sup>Patrick Center for Environmental Research, The Academy of Natural Sciences, Philadelphia, PA; <sup>3</sup>Pennsylvania Cooperative Fish & Wildlife Research Unit, U.S. Geological Survey Biological Resources Division, The Pennsylvania State University, University Park, PA; <sup>4</sup>Lock Haven University, Lock Haven, PA; <sup>5</sup>Millersville University, Millersville, PA; <sup>6</sup>CET Engineering Services, Harrisburg, PA.

**8:45-9:00**

**56.** *Mass-length regressions for different clones of the New Zealand mud snail (*Potamopyrgus antipodarum*).* **Bilka, Rachel H.\***, **Amy C. Krist**, and **Edward P. Levri**. Penn State-Altoona, Altoona, PA.

**9:00-9:15**

**57.** *Environmental characteristics and plankton dynamics of Raritan Bay, a eutrophic estuary.* **Calomeni, Alyssa\*** and **Megan Rothenberger**. Lafayette College, Easton, PA.

**9:15-9:30**

**58.** *Microhabitat selection of brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) in two sympatric populations in Pennsylvania.* **Smith, Lori A.\*** and **Mel Zimmerman**, Lycoming College, Williamsport, PA.

**9:30-9:45**

**59.** *A comparative analysis of the effects of different wavelengths of light on the growth rate, pigmentation, and behavior of *Carassius auratus* and *Danio rerio*.* **Clark, Falon\***, **Laura F. Altfeld**, and **Brad E. Engle**. Wilson College, Chambersburg, PA.

**9:45-10:00**

**60.** *Comparing vitellogenin induction by 17 $\beta$ -estradiol in male *Danio rerio* through a tritrophic bioaccumulation model and a bioconcentration model.* **Dennis, Megan\***, **Laura F. Altfeld** and **Deborah S. Austin**. Wilson College, Chambersburg, PA.

**10:00-10:15 BREAK****10:15-10:30**

**61.** *The active ingredient in anti-depressants decreases bacterial and viral content in a freshwater aquatic ecosystem.* **Mulugeta, Surafel\*** and **Steven Mauro**. Mercyhurst College, Erie, PA.

**10:30-10:45**

**62.** *Establishing standard conditions for the measurement of stress responses in the bioindicator *Lumbriculus variegatus*.* **Dager, Megan\***, **Ghaith Ibrahim**, **John Hranitz**, and **Cynthia Surmacz**. Bloomsburg University, Bloomsburg, PA.

**10:45-11:00**

**63.** *The North American amphibian monitoring program in Pennsylvania: gathering data and assessing long-term trends.* **Gipe, Kathy\***. Pennsylvania Natural Heritage Program and the Pennsylvania Fish and Boat Commission, Bellefonte, PA.

**11:00-11:15**

**64.** *Some life history traits of the spring peeper (*Pseudacris crucifer*) in Cumberland County, South Central Pennsylvania.* **Campbell, Laurel\***, **Justin Wissler**, and **Pablo R. Delis**. Shippensburg University, Shippensburg, PA.

**11:15-11:30**

**65.** *Survey of snakes in natural islands in an urban and agricultural landscape directly flanking the Shippensburg University Campus.* **Eckman, Edward\*** and **Delis, Pablo R.** Shippensburg University, Shippensburg, PA.

**ORAL SESSION VII****SUNDAY, APRIL 3****8:30 AM – 11:30 AM****MAMMOLOGY****Hawthorn 138****Howard Whidden, Session Chair****8:30-8:45**

**66.** *2010: A mammal odyssey or “where do we go from here?”* **Hart, James A.\*** Wildlife specialists, LLC. Wellsboro, PA and **Dr. Howard Whidden** East Stroudsburg University, East Stroudsburg, PA.

**8:45-9:00**

**67.** *Results of a large scale mist-netting survey of the Pine Creek Gorge area, Tioga and Potter Counties, Pennsylvania.* **Hart, James A.\***, **J. M. Benner**, and **C. Voorhees**. Wildlife Specialists, LLC. Wellsboro, PA.

**9:00-9:15**

**68.** *Acoustic monitoring of summer bat activity in the Delaware Water Gap National Recreation*

*Area.* **Flynn, Megan<sup>1\*</sup>**, **Kathy Commisso<sup>2</sup>**, **Larry Hilaire<sup>2</sup>**, and **Howard P. Whidden<sup>1</sup>**. East Stroudsburg University, East Stroudsburg, PA, and <sup>2</sup>Delaware Water Gap National Recreation Area, Bushkill, PA.

**9:15-9:30**

**69.** *A comparative study of fire ecology and small mammal effects on a Puget Sound shortgrass prairie remnant.* **Miller, William\*** and **David K. Foster**. Messiah College, Grantham, PA.

**9:30-9:45**

**70.** *Dietary correlates of carnivoran masticatory muscle architecture .* **Simpler, Elizabeth M.\*<sup>1</sup>**, **Jonathan M. G. Perry<sup>2</sup>**, and **Adam Hartstone-Rose<sup>3</sup>**. Penn State University, University Park, PA. <sup>2</sup>Midwestern University, Downers Grove, IL. <sup>3</sup>Penn State Altoona, Altoona, PA.

**9:45-10:00**

**71.** *Dietary overlap among coyotes, red foxes, and gray foxes in Northeastern Pennsylvania.* **Dodd, Raymond\*** and **Howard P. Whidden**. East Stroudsburg University, East Stroudsburg, PA.

**10:00-10:15 BREAK****10:15-10:30**

**72.** *Wild canids as sentinels of infectious disease.* **Harle, Kimberly K.\***, and **Jane E. Huffman**. East Stroudsburg University, East Stroudsburg, PA.

**10:30-10:45**

**73.** *Determining canine breed type based on fur analysis.* **Huffman, Jane**, and **Karalynn Kruger\***. East Stroudsburg University, East Stroudsburg, PA.

**10:45-11:00**

**74.** *Genetic structure of river otter (*Lontra canadensis*) populations in NJ and PA.* **Palmer, L.M.\***, **J.C. Kauffman**, and **J.E. Huffman**. Northeast Wildlife DNA Laboratory, East Stroudsburg, PA.

**11:00-11:15**

**75.** *Evaluation of the genetic diversity and paternity of New Jersey and Pennsylvania black bears (*Ursus americanus*) using eight polymorphic microsatellite loci.* **Ombrello, Teresa A.\***, **Jane E. Huffman.** East Stroudsburg University, East Stroudsburg, PA.

**11:15-11:30**

**76.** *Investigating maternal genetic variance in rural and urban white-tailed deer populations with mtDNA D-loop haplotypes.* **Linden, Lara, Elisa Angione\***, **Jedediah Seltzer, Durwood B. Ray, and Frederic J. Brenner.** Grove City College, Grove City, PA.

**POSTER SESSION I  
SATURDAY, APRIL 2  
10:00 AM- 12:00 NOON  
AQUATIC ECOLOGY**

**Hawthorn 134/148**

**Peter Petokas, Session Chair**

**77.** *Preliminary tests of a new method of producing axenic filamentous algal cultures for biofilm studies.* **Crowe, Robert, Danielle Long\*** and **Dr. J. Michael Campbell.** Mercyhurst College, Erie, PA.

**78.** *Sediment oxidation capabilities of four aquatic macrophytes.* **Freeman, Colbey\*** and **Rebecca Urban.** Lebanon Valley College, Annville, PA.

**79.** *Carbon and nutrient dynamics of *Justicia americana* in stream ecosystems.* **Keating, Michael P.\***, and **Jeffrey A. Simmons.** Mount St. Mary's University, Emmitsburg, MD.

**80.** *An experimental aeroponic algae growth system for naturally occurring Lake Erie periphyton.* **Russell, Ashley\*** and **J. Michael Campbell.** Mercyhurst College, Erie, PA.

**81.** *Evaluating the utility of periphyton as water quality indicators in the Mill Creek watershed, Erie, PA.* **Teygart, Ellen L.\*** and **J. Michael Campbell.** Mercyhurst College, Erie, PA.

**82.** *A Study of defined habitats to explore relationships between vegetation coverage & periphyton within Lower Penns Creek (Synder County, PA).* **Thorp, Nancy A\***, **Elizabeth L. Fulton, Michael D. Bilger, and Jack R. Holt.** Susquehanna University, Selinsgrove, PA.

**83.** *Land-use effects on South Central Pennsylvania streams: a comparison of fish health and fish biotic indices.* **Tucker, Cynthia A.\***, **William S. Humbert\***, **Amanda M. Ritz, Lauren E. Kessler\***, and **Theo Light.** Shippensburg University, Shippensburg, PA.

**84.** *Brook Trout spawning success in response to three alkalinity addition treatments in the Kinzua Creek watershed.* **Gordon, Matthew<sup>1\*</sup>**, **Kenneth Anderson<sup>2</sup>**, and **Andrew Turner<sup>1</sup>.** <sup>1</sup>Clarion University, Clarion, PA; <sup>2</sup>Pennsylvania Fish and Boat Commission, Tionesta, PA.

**85.** *Diet and behavior of Appalachian brook crayfish in acidic and pH remediated mountain streams.* **Helfrick, Alicia\*** and **Theo Light.** Shippensburg University, Shippensburg, PA.

**86.** *Chemosensory impairment of grey tree frog tadpoles in sewer effluent.* **Troyer, Rachael\***, and **Andrew Turner.** Clarion University, Clarion, PA.

**87.** *Prevalence of an emerging fungal pathogen (*Batrachochytrium dendrobatidis*) among eastern hellbender (*Cryptobranchus a. alleganiensis*) populations in the Allegheny River watershed, Pennsylvania.* **Kirschman, Lucas J.\***, **Seth W. Kerr**, and **Kurt J. Regester,** Clarion University, Clarion, PA, and **Eric J. Chapman,** Western Pennsylvania Conservancy, Blairsville, PA.

**88.** *Body size, health condition, external appearance, and sexual dimorphism in eastern hellbenders from North-Central Pennsylvania.* **Forestal, Gwendolyn\***, **Nicholas Lansberry, Megan Schultze,** and **Peter J. Petokas.** Lycoming College, Williamsport, PA.

- 89.** *Regulation of settlement and metamorphosis of larvae of *Capitella teleta* by serotonin.* **Ricker, Tylor\***, **Renee Poesnecker**, **Sean Deats**, and **William J. Biggers**. Wilkes University, Wilkes-Barre, PA.
- 90.** *The relationship between sex and aggression in a cichlid fish model system.* **Mogle, Catherine A.\*** and **Dr. Audrey J. Ettinger**. Cedar Crest College, Allentown, PA.
- 91.** *Are only aggressive male *Rocio octofasciata* sexually mature?* **Sween, Kayla R.\*** and **Dr. Audrey J. Ettinger**. Cedar Crest College, Allentown, PA.
- 92.** *The effects of temperature and body size on the metabolic rate of the freshwater amphipod *Gammarus minus*, a comparison of two models.* **Gring, Jeffrey P.\*** and **Douglas S. Glazier**. Juniata College, Huntingdon, PA.
- 93.** *The effect of coarse woody debris load on abundance & diversity of benthic macroinvertebrate communities in head water streams.* **Simpson, Aiden\***, and **Andrew C. Keth**. Clarion University of Pennsylvania, Clarion, PA.
- 94.** *An analysis of the benthic insect community in McMichael's Creek, PA under open and closed tree canopies.* **Hartzler, Christopher\***, **James R. Hartzler**, and **Bradley G. Rehnberg**. York College of Pennsylvania, York, PA.
- 95.** *Results of the relationships between members of the benthic community from discrete samples defined by water depth and discharge in lower Penns Creek (Snyder County, PA).* **Fulton, Elizabeth L.\***, **Nancy A. Thorp**, **Michael D. Bilger**, and **Jack R. Holt**. Susquehanna University, Selinsgrove, PA.
- 96.** *Benthic macroinvertebrates of the Middle Susquehanna River Basin: between site comparisons at the Byers Island Transect for the years of 2009-2010.* **Haklar, David\***, **John Kilmer**, **Mike Bilger**, and **Jack Holt**. Susquehanna University, Selinsgrove, PA.
- 97.** *Impacts of sedimentation from oil and gas development on stream macroinvertebrates in two adjacent watersheds of the Allegheny National Forest of Northwestern Pennsylvania.* **Fritz, Kelley\*<sup>1</sup>**, **Steven Harris<sup>1</sup>**, **Harry Edenborn<sup>2</sup>**, and **James Sams<sup>2</sup>**. <sup>1</sup>Clarion University of Pennsylvania, Clarion, PA, <sup>2</sup>National Energy Technology Laboratory, U.S. Dept. Energy, Pittsburgh, PA.
- 98.** *Nutrient removal ability of a stream receiving wastewater effluent.* **Simmons, Jeffrey A.\*** Mount St. Mary's University, Emmitsburg, MD.
- 99.** *The active ingredient in anti-depressants decreases bacterial and viral content in a freshwater aquatic ecosystem.* **Mulugeta, Surafel\***, **Eric Clark**, **Drew Spacht**, **Gillian Jones**, **Irfan Haider**, and **Steven Mauro**. Mercyhurst College, Erie, PA.
- 100.** *"Uck! What am I swimming in?!" A stream comparison using biochemical indicators.* **Cypher, Alysha\***, **Richard Londraville**, and **Bill Zawiski**. Clarion University of Pennsylvania, Clarion PA, University of Akron, Akron OH.
- 101.** *Water analysis in the vicinity of a release point of Marcellus Frac water treatment facility on Susquehanna River.* **Fathel, Siobhan\*** and **Ahmed Lachhab**. Susquehanna University, Selinsgrove, PA.
- 102.** *Mahanoy creek acid mine drainage: an effort to assess water quality.* **Jaeger, Wendy\*** and **Dr. Ahmed Lachhab**. Susquehanna University, Selinsgrove, PA.

**103.** *Assessing the quality and availability of Geographic Information System (GIS) data for point and non-point sources of nutrients and pollutants in the Raritan River Basin.* **Chun, Andrew\*** and **Megan Rothenberger.** Lafayette College, Easton, PA.

**104.** *A GIS-based model for the rapid assessment of the impacts of land use change on soil and water quality in agricultural watersheds.* **Emili, Lisa\*.** Penn State Altoona, Altoona, PA.

**105.** *Preliminary experimentation of an aeroponic algal growth apparatus for CO<sub>2</sub> enrichment.* **Campbell, Mike. J,** and **Robert L. Crowe\*.** Mercyhurst College, Erie, Pa.

**POSTER SESSION II  
SATURDAY, APRIL 2**

**2:00 PM- 4:00 PM**

**ECOLOGY AND ENVIRONMENTAL  
SCIENCE**

**Hawthorn 134/148**

**Shannon Nix, Session Chair**

**106.** *Optimization of the solar thermal heating system for residential use.* **Grebski, Wes\*.** The Pennsylvania State University, Hazleton, PA.

**107.** *A laboratory-Assembled Resistivity meter and its implementation to identify buried foundation walls.* **Booterbaugh, Aaron\*** and **Ahmed Lachhab.** Susquehanna University, Selinsgrove, PA.

**108.** *Using LIDAR data to identify abandoned coal mines for the construction of a seasonal storage pit.* **Dolney, Timothy\*** and **Richard Flarend.** Penn State University Altoona, Altoona, PA.

**109.** *EcoEd Digital Library: Supporting innovative undergraduate ecology education through peer-reviewed collections.* **Klemow, Kenneth, David Kirschtel, Kathleen Shea,** and **Teresa Mourad.** Wilkes University, Wilkes-Barre, PA; Education

Consultant, Boston, MA; St. Olaf College, Northfield, MN; Ecological Society of America, DC.

**110.** *Developing a podcast trail guide for Nuangola Bog, Luzerne County, PA.* **Maloney, Brittany, Courtney Sperger,** and **Kenneth Klemow.** Wilkes University, Wilkes-Barre, PA.

**111.** *Effects of streamside vegetation on muskrat relative abundance in Pennsylvania.* **Repasky, Stephen J.\*** PA Game Commission, Harrisburg, PA.

**112.** *Remote sensing of potential Allegheny woodrat habitat and presence in Pennsylvania.* **Swimley, Thomas,\* Merlin Benner, Brian Benner,** and **Cody Felton.** Wildlife Specialists, LLC, Wellsboro, PA.

**113.** *Occurrence of the giant kidney worm (*Diocotophyma renale*) in long-tailed weasels (*Mustela frenata*) from Pennsylvania.* **Kauffman, James C.\*, Kimberly K. Harle, Matthew J. Swallow,** and **Jane E. Huffman.** East Stroudsburg University of Pennsylvania, East Stroudsburg, PA.

**114.** *A survey of the parasites of coyotes (*Canis latrans*) and red foxes (*Vulpes vulpes*) in Pennsylvania based on fecal analysis.* **Bove, Daniel J.\*, Kimberly Harle,** and **Jane E. Huffman.** Northeast Wildlife DNA Laboratory, East Stroudsburg, PA.

**115.** *The influence of ambient and den temperature on the above-ground activity of woodchucks (*Marmota monax*) in south-central Pennsylvania.* **Riley, Mary\* and Bradley Rehnberg.** York College of Pennsylvania, York, PA.

**116.** *Prevalence of avian blood parasites in song sparrows (*Melospiza melodia*) along an urban-rural gradient in northeast Pennsylvania.* **Bartlow, A., J. Stratford, N. Lamoreaux, C. Bartlow\*, M. Olsommer, P. Payne.** Wilkes University, Wilkes-Barre, PA.

**117.** *Bluebird skeletal morphology: a phylogenetic thrush or a functional flycatcher?* **Corbin, Clay E.** and **Lauren K. Lowenberger\***. Bloomsburg University, Bloomsburg, PA.

**118.** *Social and foraging behaviors of male and female white-breasted nuthatch (*Sitta Carolinensis*) pairs, and differences in physiological fitness based on ptilochronology and physical appearances.* **Barnes, Katie\*** and **Jim Kellam**. Saint Vincent College. Latrobe, PA.

**119.** *Nest-site characteristics of mountain plovers breeding on prairie dog colonies in northeastern New Mexico.* **Klomps, Lawrence V.\*** and **Christopher B. Goguen**. Pennsylvania State University, Hazleton, PA.

**120.** *Hawk feeders?: estimates of predation rates by hawks at bird feeders in a suburban area.* **Mickey, Scott E.** and **Les D. Murray\***. Penn State Abington, Abington, PA.

**121.** *Recent investigations of the fossils of Hartman Cave, Monroe County, PA: Newly recovered mammalian fossils.* **Tyler, Melissa\***, and **Thomas C. LaDuke**. East Stroudsburg University, East Stroudsburg, PA.

**122.** *Forensic entomology applications of mass temperature vs. ambient temperature effects on *Sarcophaga bullata*.* **Beck, Kayla A.\***, **Garrett W. Beatty**, and **Andrew C. Keth**. Clarion University, Clarion, PA.

**123.** *Cold tolerance of the brown marmorated stink bug, *Halyomorpha halys*: implications for future range expansion.* **Kissman, Amber\*** and **Michael A. Elnitsky**. Mercyhurst College, Erie, PA.

**124.** *The acquisition of freeze tolerance in the goldenrod gall fly, *Eurosta solidaginis*: environmental triggers and physiological correlates.* **Kandfer, Rachel\*** and **Michael A. Elnitsky**. Mercyhurst College, Erie, PA.

**125.** *Silk webs of the fall webworm (*Hyphantria cunea*): hot spots and their resistance to forced convective cooling.* **Rehnberg, Bradley\***. York College of Pennsylvania, York, PA.

**126.** *Managing the health of hemlocks at Morris Arboretum of the University of Pennsylvania.* **Beerley, Tracy\*** and **Ann F Rhoads**. Morris Arboretum of the University of Pennsylvania. Philadelphia, PA.

**127.** *Forest condition in and around a site cleared for a Marcellus well pad and a wind turbine—a case study in north-central Pennsylvania.* **Mahan, Carolyn\***, and **Kevin Pulver**, Penn State Altoona, Altoona, PA. **Jim Finley**, Penn State University, University Park, PA.

**128.** *The impact of timber harvest on the pollinating insect communities in south central Pennsylvania.* **Weber, Nathan\***, **Emily Carothers**, **Alicia Helfrick**, and **Heather Sahli**. Shippensburg University of Pennsylvania, Shippensburg, PA.

**129.** *The impact of timber harvest on pollinator visitation and plant reproduction in south central Pennsylvania.* **Braund, Jaclyn \*** **Alicia Helfrick**, and **Heather F. Sahli**. Shippensburg University, Shippensburg, PA.

**130.** *Inhibition of woody colonization on a reclaimed anthracite mine: seed rain and seed bank dynamics.* **Cheehan, Anthony**, **Matthew Haas**, **George Sworen**, and **Kenneth Klemow**. Wilkes University. Wilkes-Barre, PA.

**131.** *Effects of temperature and self-pollen on pollen tube growth in flowers of Christmas cactus (*Zygocactus sp.*).* **Faivre, Amy E.**, **Leia Epstein**, **Mehveen R. Qureshi**, and **Amanda E. Rocklyn\***. Cedar Crest College, Allentown, PA.

**132.** *Descriptions and measurements of early Ovule Development through Megagametogenesis in Ranunculus repens L.-Ranunculaceae.* **Syed\***, **Bakhtair** and **Bruce B Smith**, York College of Pennsylvania, York, PA.

**133.** *The impact on nutritional composition, metal accumulation and plant growth of vernal alfalfa (Medicago sativa) grown in flyash amended soils.* **Firment\***, **Chad**, **Joseph Fiedor**, **Suzanne Boyden** and **Shannon Nix**. Clarion University of Pennsylvania, Clarion, PA.

**134.** *Effects of flyash on soil processes and chemistry: Helpful or harmful?* **Gruzinski, Jamie\***, **Keri Lynn**, **Joe Fiedor**, **Shannon Nix**, and **Suzanne Boyden**. Clarion University, Clarion, PA.

**135.** *Effect and efficiency of the plant-growth promoting bacteria, Fraturia aurantia, in improving market crops maturity rate.* **Wolfe, Courtney\*** and **Keler, Cynthia**. Delaware Valley College, Doylestown, PA.

**136.** *The affect of plant growth promoting bacteria on sun flowers in varying salt concentrations.* **Dickinson, Courtney\*** and **Cynthia Keler**. Delaware Valley College, Doylestown, PA.

**137.** *Feasibility of micro wind turbines for home use in Central Pennsylvania.* **Moyer, Zachary\*** and **Daniel Ressler**. Susquehanna University, Selinsgrove, PA.

**138.** *Determining cloud point, specific gravity, and energy content of a homemade biofuel.* **Koons, Dustin\***, and **Daniel Ressler**. Susquehanna University, Selinsgrove, PA.

### POSTER SESSION III

SUNDAY, APRIL 3

9:30 AM- 11:30 AM

### CELL BIOLOGY AND BIOCHEMISTRY

Hawthorn 134/148

**Alyssa Bumbaugh, Session Chair**

**139.** *Electroreduction of activated alkenes in room temperature ionic liquids.* **Manchanayakage, Renuka** and **Aaron Jones\***. Susquehanna University, Selinsgrove, PA.

**140.** *Molecular weight and concentration dependence on the thermo-reversible gelation of polycaprolactone.* **Foreman, Benjamin\***, and **Isaac VonRue**. King's College, Wilkes-Barre, PA.

**141.** *Both nicotinic and muscarinic cholinergic receptors on the ciliary ganglion mediate pupil constriction in red-eared slider turtles, Trachemys scripta elegans.* **Leone, Alyssa M.\***, **Meghan A. Schlitt**, and **James R. Dearworth Jr.** Lafayette College, Easton, PA.

**142.** *Observing the rate of rod photoreceptor differentiation and the migration of newly proliferated rod progenitors in Rocio octofasciata.* **O'Donnell, Erin M.\*** and **Dr. Audrey J. Ettinger**. Cedar Crest College, Allentown, PA.

**143.** *The identification and expression of synapsin IIa in zebrafish.* **Welsh, Kelly\*** and **Wendy Boehmler**. York College of Pennsylvania, York, PA.

**144.** *Utilizing fluorescence resonance energy transfer (FRET) to study exchange rates in class II ZmHsp 17.0 oligomeric subunits in the presence of heat denatured citrate synthase.* **Wademan, Meagan\***, and **Hannah Tims**. Messiah College, Grantham, PA.

- 145.** *The use of high-throughput isothermal titration calorimetry (HT-ITC) and high-throughput differential scanning calorimetry (HT-DSC) to investigate the effects of ligand binding on DNA aptamers.* **Diegelman-Parente, Amy** and **Gregg Robbins-Welty.\*** Mercyhurst College, Mercyhurst, PA.
- 146.** *Rational design of a biological sensor for ATP.* **Diegelman-Parente, Amy** and **Ashley Westgate.\*** Mercyhurst College, Mercyhurst, PA.
- 147.** *The role of the snoA C-terminus as a mediator of meiotic recombination and double strand break repair in Aspergillus nidulans.* **Shingler, Kristin L.\*** and **Steven W. James.** Gettysburg College, Gettysburg, PA.
- 148.** *Functional analysis of conserved SSPP and SSPT motifs in the snoA mediator of meiotic recombination.* **Kelliher, Christina\*** and **Steven James.** Gettysburg College, Gettysburg, PA.
- 149.** *Essential structural characteristics of the Saccharomyces cerevisiae Srs2 helicase C-terminal region to its multifaceted role in mediating homologous recombination events.* **Shaley, Kiel\*** and **Villemain, Jana L.** Indiana University of Pennsylvania, Indiana, PA.
- 150.** *Identification of phosphorylation sites important for Replication Protein A DNA repair functions in the budding yeast Saccharomyces cerevisiae.* **Olier, Samantha\*, René Norman,** and **André P. Walther.** Cedar Crest College, Allentown, PA.
- 151.** *Identification of novel interactions between Replication Protein A and cellular proteins in the budding yeast Saccharomyces cerevisiae.* **Mahoney, Chelsea\*, Kayla Hager,** and **André Walther.** Cedar Crest College, Allentown, PA.
- 152.** *Replication Protein A phosphorylation regulates cell cycle progression in the presence of damaged DNA or defective microtubule spindles in Saccharomyces cerevisiae.* **Bender, Courtney\*, Cristina Cardenas\*, Sarah Klein,** and **André P. Walther.** Cedar Crest College, Allentown, PA.
- 153.** *Examination of a potential protein-protein interaction between Replication Protein A and PIF1 in the budding yeast Saccharomyces cerevisiae.* **King, Tabitha\*,** and **André P. Walther.** Cedar Crest College, Allentown, PA.
- 154.** *Assessing the role of Hst1 sirtuin in meiotic development in S. cerevisiae.* **Skokotas, Aikaterini, Tetyana Churyi, Ameema Hashmi, Hizamar Ponce\*, Winifred Wolfe\*,** and **Edward Winter.** Rosemont College, Rosemont, PA, and Thomas Jefferson University, Philadelphia, PA.
- 155.** *The use of p-XSC as a chemopreventative agent in Saccharomyces cerevisiae.* **Resnick, Shoval\*, André P. Walther,** and **Marianne Staretz.** Cedar Crest College, Allentown, PA.
- 156.** *Enhanced killing of metastatic tumor cells with combinations of natural compounds resveratrol and quercetin.* **Cifra, Nicole\*, Laura Stevens\*,** and **Jessalee Wantz, Frederic J. Brenner.** Grove City College, Grove City, PA.
- 157.** *Therapeutic effects of Thrombospondin 1 derived peptides on inflammatory bowel disease.* **Robert, Terry\*, Anastasya Menaker, Brittany Lippert, Rebecca Stanton, Bhumi Patel, Bethany Eiche, Michelle Wakeley, Justin Gentile, Mohammed Abu Riyaleh, Tiffany Zehner, Zenaida Lopez-Dee, Jack Lawler<sup>1</sup>** and **Linda S. Gutierrez.** Wilkes University, Wilkes-Barre, PA and Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA.
- 158.** *The anti-proliferative effect of human chorionic gonadotropin on breast epithelial cells may be mediated through a reactive oxygen species pathway.* **Mustazza, Joseph\*** and **Thomas M. McGuire.** Penn State Abington, Abington, PA.

- 159.** *Regulation of Hsp70 and Hsp32 gene expression by human chorionic gonadotropin in breast epithelial cells.* **Focht, Joshua D.\*** and **Thomas M. McGuire.** Penn State Abington, Abington, PA.
- 160.** *Expression of Thrombospondin 1 in a rat model of Polycystic Kidney Disease.* **Dally, John\*, Phat Nguyen, Courtney Spelger, Hannah Laimer, Dawn Gregor, Kyra Phair, Priscella Payne, Valerie Kalter** and **Linda S. Gutierrez.** Wilkes University, Wilkes-Barre, PA.
- 161.** *The role of autophagy in Shigella flexneri infections.* **Gau, Yael\*, Nicole O'Brien\*, Jeff Myers, Alyssa Bumbaugh** and **Lucinda Elliott.** Shippensburg University, PA.
- 162.** *Role of the copper sensing transcription factor Cuf1p on macrophage phagocytosis and killing by Cryptococcus neoformans.* **Trengge, Shelby\*, Chelsea Manes** and **Jeramia Ory.** King's College, Wilkes-Barre, PA.
- 163.** *Novel activation mechanism of programmed cell death via interaction of CCHL (cytochrome c heme lyase) with IAP (inhibitor of apoptosis).* **Chwiecko, Brian<sup>1\*</sup>, Lawrence Fredericks<sup>1\*</sup>, Terry Weller<sup>1\*</sup>, Matthew Junker<sup>1</sup>, and Carsten Sanders<sup>2,3</sup>.** <sup>1</sup>Kutztown University, Kutztown, PA; <sup>2</sup>University of Pennsylvania, Philadelphia, PA; <sup>3</sup>Harrisburg University, Harrisburg, PA.
- 164.** *Testing Gingko biloba as a treatment for apoptosis in a chick primary neuron model.* **Harlin, Heather M.\*, Marissa L. Marietti,** and **Dr. Audrey J. Ettinger.** Cedar Crest College; Allentown, PA.
- 165.** *Microarray analysis of clinical isolates of Cryptococcus neoformans.* **Kish, Alexander\*, Erin McClelland** and **Jeramia Ory.** King's College, Wilkes-Barre, PA and The Commonwealth Medical College, Scranton, PA.
- 166.** *Comparative genomic characterization of a novel mycobacteriophage.* **Mageaney, Catherine\*, David Dunbar,** and **Melinda Harrison.** Cabrini College, Radnor, PA.
- 167.** *Pathogenic bacteria on non-clinical cell phones.* **Williams, Stefanie\*** and **Carolyn F. Mathur.** York College of PA, York, PA.
- 168.** *Prion propagation in response to temperature and osmotic stress.* **Dhillon, Jess-Karan\*, and David R. Singleton.** York College of Pennsylvania, York, PA.
- 169.** *Molecular and cellular responses of flora and fauna to environmental stimuli.* **Ramdaney, Aarti\*, Kara Welch\*, and K. Joy Karnas.** Cedar Crest College, Allentown, PA.
- 170.** *Yeasts under stress: Are Rhodotorula more tolerant to UV than both pathogenic Cryptococcus neoformans and the model yeast Saccharomyces cerevisiae?* **Choi, Young-eun\*** and **Amy J. Reese** Cedar Crest College, Allentown PA.
- 171.** *Why does Cryptococcus neoformans need alpha-1,3-glucanase?* **Morra, Christina\*** and **Amy J. Reese** Cedar Crest College, Allentown PA.
- 172.** *Observing the growth rate of Chlamydomonas reinhardtii when exposed to various concentrations of selenium.* **Rocco, Sarah\*, Derreck Shenk** and **Melinda Harrison** Cabrini College, Radnor, PA.
- 173.** *The role of CNLAC1 and CNLAC2 in Azure B reactive activity in Cryptococcus neoformans.* **Grundowski, Janel\*** and **Jeramia Ory.** King's College, Wilkes-Barre, PA.
- 174.** *The effect of modified copper-sensing elements in the regulated CTR4 promoter system of Cryptococcus neoformans.* **De Palma, Ryan\*** and **Jeramia Ory.** King's College, Wilkes-Barre, PA.

**175.** *Isolation of microorganisms from Antarctic permafrost soils.* **Malmberg, Eric J.\*, Frank R. Wendt, Corien Bakermans, and Susanne Douglas.** Pennsylvania State University Altoona, Altoona, PA, and the NASA Jet Propulsion Laboratory, Pasadena, CA.

**176.** *Diversity of 16S rRNA genes of uncultured microorganisms from Antarctic permafrost.* **Wendt, Frank R.\*, Eric J. Malmberg, Corien Bakermans, Susanne Douglas.** Pennsylvania State University Altoona, Altoona, PA and the NASA Jet Propulsion Laboratory, Pasadena, CA.

**177.** *Real-time PCR assay for Burkholderia gladioli.* **Glick, David L.<sup>1</sup>, Natalie Crawley<sup>1\*</sup>, Lisa Grant<sup>1\*</sup>, and Michael A. Sulzinski<sup>2</sup>.** <sup>1</sup>King's College, Wilkes-Barre, PA. <sup>2</sup>University of Scranton, Scranton, PA.

**178.** *Exploration of invasive Escherichia coli infections in the larval stages of the housefly vector, Musca domestica.* **Brown, Sarah\*, Alyson Sharer\*, and Alyssa Bumbaugh.** Shippensburg University, Shippensburg, PA.

**179.** *A comparison of canine parvovirus infections at two Pennsylvania animal shelters.* **Wolf, Leann\* and Carolyn F. Mathur.** York College of PA, York, PA.

**180.** *Molecular characterization of Babesia in black bears (Ursus americanus) in New Jersey.* **Shaw, Melissa\* and Jane E. Huffman.** East Stroudsburg University, East Stroudsburg, PA.

**181.** *Molecular identification of wild game DNA from maggot crops.* **Drago, Caroline\* and Jane E. Huffman.** East Stroudsburg University, East Stroudsburg, PA.

**182.** *Population genetics of Pennsylvania and New Jersey bobcats (Lynx rufus) using microsatellites.* **Fuentes, Samantha\* and Jane E. Huffman.** East Stroudsburg University, East Stroudsburg, PA.

**183.** *Phylogenetic analysis of the Brant goose, Branta bernicla, on the basis of complete mitochondrial D-loop sequence comparisons.* **Gill, Hasreet K.\*, Olivia Helfer, Frederic J. Brenner and Durwood B. Ray.** Grove City College, Grove City, PA.

## Abstracts of Papers

87<sup>th</sup> Annual Meeting  
of the Pennsylvania Academy of Science

April 1-3, 2011

Penn State University Altoona  
Altoona, PA

(Arranged in alphabetical order of first authors or presenters)

**Akuffo, Afua\***, Robert Kurt, Jason Ewer, and Caroline Vail. Lafayette College, Easton PA 18042. *Analyzing the role TRAM plays in TLR4/LPS signaling in 4T1 murine mammary carcinoma* - When lipopolysaccharide (LPS), a molecule found on gram-negative bacteria, binds Toll-like receptor 4 (TLR4) the myeloid differentiation factor 88 (MyD88)-dependent, and TIR domain-containing adapter inducing interferon- $\beta$  (TRIF)-dependent pathways are activated. Activation of these pathways leads to transcription of inflammatory chemokines and cytokines that stimulate an immune response. TRAM is the adapter molecule that mediates the TRIF-dependent pathway. We wished to determine the effects of varying the expression levels of TRAM on 4T1 tumor cells. For this purpose we generated a eukaryotic expression vector encoding shRNA specific for TRAM, and another vector containing cDNA encoding full length TRAM. These vectors were used to transfect 4T1 and following drug selection, the cells were cloned and screened by quantitative polymerase chain reaction for TRAM levels. We identified 6 clones with reduced levels of TRAM, and 5 clones with elevated levels of TRAM. We are currently determining which of the clones are stable and will use them to determine whether TRAM levels influence responsiveness to LPS. This project was supported by the NIH grant R15 CA137858-01 (13)

**Alladin, Ambreen\***, Katie Mageeney, Dr. David Dunbar and Dr. Melinda Harrison. Cabrini College, Radnor, PA 19087. *The Use of Bioinformatics to Identify Marvin, a Novel Microbacteriophage* - This is part of an ongoing study to determine the

identity of a novel microbacteriophage identified on the Cabrini College campus. Microbacteriophage samples were taken from various locations on campus. With the support of Howard Hughes Medical Institute "HHMI", uniform methods of purifying microbacteriophage samples were implemented by the Cabrini College Science Department. Restriction digests were then done to facilitate the comparison of these samples to known microbacteriophage clusters. One particular phage, Marvin, was found to have enough of a distinction from the known clusters that further genomic work was warranted. The Marvin samples were sequenced and evaluated using a variety of bioinformatics tools. As a result, the hydrophobicity (Kyle et al. method), amino acids and codons were analyzed. In addition, a BLAST search was run to identify closely related microbacteriophages. The most closely related phage had a 98% similarity. Based on these results, it seems that Marvin is in fact a new microbacteriophage and further bioinformatics work is underway. (20)

**Andersen, Kelsey\*** and Manuel Ospina-Giraldito. Biology Department, Lafayette College, Easton, PA 18042. *Pathogenicity of new clonal lineages of Phytophthora infestans on potato cultivars* - Late blight, caused by *Phytophthora infestans*, continues to be the most devastating and economically important disease affecting potato crops worldwide. Recent geographical migrations of the pathogen have displaced the 'old' US-1 clonal lineage with 'new', genotypically distinct, lineages. These new genotypes have shown increased pathogenic fitness and diverse environmental

requirements. Interactions between two different isolates of the US-8 race and three potato (*Solanum tuberosum*) cultivars were analyzed through *in planta* infection under controlled laboratory conditions. Disease development over time was rated for each experimental unit by determining incubation period, foliar lesion area and relative number of leaves displaying necrosis. Data suggest that differential pathogenicity between the US-8 isolates exists. Cultivar susceptibility was also variable. Contrary to previous studies, it was found that cv. Kennebec was least susceptible to either pathogen. Along with *in planta* infection, effect of temperature on the disease cycle was also evaluated using a detached leaf assay (DLA). Confirmation of pathogen presence in infected leaf tissue was successfully obtained using previously developed *P. infestans* specific primers (PINF and ITS5) in a Polymerase Chain Reaction (PCR) assay. Further results of these investigations will be presented and discussed. (47)

**Bakermans, Marja H.\* and Jeffrey L. Larkin.** Indiana University of Pennsylvania, Indiana, PA 15705. *Creating a BMP (best management practices) for Pennsylvania and Maryland's forestlands for the Golden-winged Warbler – The Golden-winged Warbler (*Vermivora chrysoptera*), a migratory songbird that breeds locally, is one of the most critically threatened, non-federally listed vertebrates in eastern North America. We provide a science-based approach to understand breeding habitat use of Golden-winged Warblers across a range of timber harvest prescriptions in Pennsylvania and Maryland forests to create the first habitat BMP for this species. Data were collected at 96 timber harvest stands that varied in size, age, forest cover, and residual basal area. In 2010, we surveyed 127 point counts over 3 occasions to ascertain Golden-winged Warbler presence across these stands. Golden-winged Warblers were detected in 20% of stands allowing us to compare stand- and landscape-level habitat variables in stands with and without Golden-winged Warblers. We analyzed these data using logistic regression and ran three analyses based on the various spatial*

scales at which habitat data were collected. The results of these analyses form the foundation of the management guidelines in the BMP. Namely, this BMP highlights the importance of forest cover, elevation, nearby disturbances, and a forested edge. At a smaller scale, we emphasize the need for varying amounts of shrubs, saplings, herbaceous plants, and bare ground with scattered trees and snags. (37)

**Barnes, Katie\* and Jim Kellam.** Saint Vincent College, Latrobe, PA 15650. *Social and Foraging Behaviors of Male and Female White-breasted Nuthatch (*Sitta Carolinensis*) Pairs, and Differences in Physiological Fitness based on Ptilochronology and Physical Appearances-* The purpose of this study was to examine social and foraging behaviors of White-breasted Nuthatches, and to observe differences in physiological fitness in monogamous pairs. Achieving proper fitness is important for growth, survivorship, and reproduction. Overall physical and nutritional condition of male and female nuthatches corresponded with foraging and vigilance frequencies, as well as feather growth rates. Radio transmitters were applied to nuthatches to monitor social behavior within their natural habitat. Ptilochronology was used to study tail feather growth. Due to male social dominance, males had a significantly greater foraging frequency than the females. The male and female vigilance frequencies (looks/minute) were not significantly different. No significant difference in body condition between genders was found. Average growth bar widths of male and female tail rectrices indicated that males grew slightly faster in a 24-hour growth period, but a low sample size may be the reason for insignificant results. (118)

**Barrett, Patrick, Vicki Bendus, Rachel Kandefer, Amber Kissman, and Michael A. Elnitsky\*.** Department of Biology, Mercyhurst College, Erie, PA 16546 USA. *Using ectotherm cold tolerance and overwintering physiology to predict climate change winners and losers – A major challenge facing the scientific community is the development of methods that measure and assess ongoing and*

future impacts of climate change on plant and animal populations. Physiological studies can help to predict the effects of climate change by determining the thermal tolerances (both high and low) of ectothermic animals, which species' distributions are currently limited by high/low temperature, which physiological systems set these limits, and how species differ in their ability to acclimatize thereby modifying their thermal tolerances. Additionally, sublethal effects of extreme temperatures (either high or low) likely have important fitness consequences for ectotherms in temperate and polar environments. We have established several model systems to investigate questions in animal physiological ecology, and in particular low temperature biology, including the goldenrod gall fly *Eurosta solidaginis*, the Antarctic midge *Belgica antarctica*, the invasive brown marmorated stink bug *Halyomorpha halys*, and the wood frog, *Lithobates sylvatica*. Our results are discussed in the context of current and future climate change and the potential impacts on these and other ectothermic animals. (4)

**Barrieres, Kelly A.\* and Jennifer L. White.** East Stroudsburg University, East Stroudsburg, PA 18301. *Morphometric Analysis of Nuclei, Lumens, and Shape of Lactiferous Ducts in Cancerous Breast Tissue* – As the most common form of breast cancer in women, ductal carcinoma accounts for 70-80% of breast cancer cases. Pathologists often use the Nottingham grading system to assess the abnormality and aggressiveness of invading cancerous cells. A grade of 1 to 3 is assigned using a point system based upon variation in nuclear appearance, tubule formation, and mitotic count, but these features are generally not all quantified. The goal of this study was to collect morphometric data on nuclei and ducts to attempt to quantify nuclear variation and tubule formation. Measurements of over 2000 nuclei and 65 ducts were made on slides of normal breast tissue and the three grades of ductal carcinoma from anonymous patients at Pocono Medical Center. A ratio of lumen area to duct area in cancerous tissue within each grade was also calculated, and shapes of duct outlines

were examined. ANOVA revealed significant differences in nuclear diameter among grades: both diameter and variation in diameter increased with grade. Variability and irregularity of nuclear and duct shape also increased with grade. Lumen/duct area ratios decreased with severity of invasion and approached 0 in grade 3. These morphometric data may provide objective and quantifiable verification of grade designations. (14)

**Bartlow, A., J. Stratford, N. Lamoreaux, C. Bartlow\*, M. Olsommer, P. Payne.** Wilkes University, Wilkes-Barre, PA 18766. *Prevalence of avian blood parasites in song sparrows (*Melospiza melodia*) along an urban-rural gradient in northeast Pennsylvania* – Species abundance and community composition change along an urban-rural gradient. Using song sparrows (*Melospiza melodia*), we explored the relationship between body condition, haemosporidian parasite prevalence, and land use. We examined blood smears from sparrows captured throughout the urban-rural gradient and used satellite imagery to obtain land use information from sites where birds were captured. Variation in body condition was best explained by the amount of urbanization and forest cover within 90 m of the point of capture. Blood parasite prevalence was best explained by the amount of forest area within 90 m and the amount of urbanization within 210 m of the point of capture. Both body condition and parasite prevalence were positively related to amount of forest cover and urban cover, although the amount of forest cover was more important in both cases. Our results imply increased parasite prevalence at the urban-rural interface where forest and urban cover mixes. Our results suggest increasing urban sprawl will result in increased blood parasite prevalence. (116)

**Bearoff, Frank M.\* and Sheryl L. Fuller-Espie.** Cabrini College, Radnor, PA 19087. *Using JC-1 and annexin V-FITC to assess changes in mitochondrial membrane potential and phosphatidylserine translocation as indicators of apoptosis in response to heavy metals in coelomocytes of *Eisenia hortensis*: A flow cytometric study of innate immunity in in-*

*vertebrates* – This work is part of ongoing studies investigating effects of the heavy metals copper and cadmium on cells (coelomocytes) of the innate immune system of the earthworm *Eisenia hortensis*. Previous studies investigating reactive oxygen species production in response to these heavy metals (HMs) revealed increased cellular death associated with HM exposure. This study's goal was to determine if death occurred through necrosis or apoptosis and if the latter, whether a caspase-dependent or independent mechanism is involved. The results of several *in vitro* experiments will be presented where coelomocytes were assessed for indicators of early apoptosis, such as collapse of mitochondrial membrane potential ( $\Delta\Psi_m$ ) and phosphatidylserine translocation (PST), in response to these HMs. The lipophilic dye JC-1 determined  $\Delta\Psi_m$  by measuring the change from orange to green fluorescence as membranes depolarize. PST was detected using FITC-conjugated annexin V which fluoresces when bound to the outer membrane leaflet of intact cells. Caspase involvement was determined with the general caspase inhibitor Z-VAD-FMK. Our results showed no inhibitory effects on  $\Delta\Psi_m$  suggesting HM-induced apoptosis in earthworm coelomocytes operates through a caspase-independent pathway. Additionally, there was a strong correlation ( $\rho \geq 0.65$  in 80% of cases) between increases in  $\Delta\Psi_m$  and increases in PST. (29)

**Beck, Kayla A.\*, Garrett W. Beatty, and Andrew C. Keth.** Clarion University, Clarion, PA 16214. *Forensic Entomology Applications of Mass Temperature vs. Ambient Temperature Effects on Sarcophaga bullata*. Forensic entomology can aid in solving crimes by determining the approximate time of death of recovered corpses. At various points of decomposition, particular insects will be prevalent within a corpse. Such insects will be in specific developmental stages, referred to as instars, which are the periods of growth and exoskeleton shedding. Time of death can be approximated by observing these stages. Life cycles of insects are impacted by temperature, however temperature is dependent upon both ambient temperature and

the heat generated within the mass of insects. The insect studied in this experiment is the *Sarcophaga bullata*, which is a species of fly that can be found primarily in the Eastern United States. By studying metabolic activity and observing respiration in maggot masses, this research was aimed at determining the ability of an insect mass to generate its own heat. Respirometry and environmental chambers were utilized to better understand insect mass temperature tolerance and life-cycle development in order to suggest the possibility of error in current and previous time of death estimations. (122)

**Beerley, Tracy\* and Ann F Rhoads.** Morris Arboretum of the University of Pennsylvania. Philadelphia, PA 19118. *Managing the Health of Hemlocks at Morris Arboretum of the University of Pennsylvania*. – *Adelges tsuga* (hemlock woolly adelgid), is an invasive insect pest from Asia affecting the health of eastern, native hemlocks, *Tsuga canadensis* and *T. caroliniana*, since 1951. Hemlock species are an important component of the living collection of the Morris Arboretum due to their role in the landscape and the tradition of plant exploration. The collection consists of wild-collectors from North America; *T. canadensis* and *T. caroliniana* and Asia; *T. chinensis*, *T. diversifolia*, *T. macrophylla* and *T. sieboldii*. These specimens were studied to evaluate canopy density, pest population levels and tree vigor. With this information treatment was applied using systemic insecticides, Merit and Safari, or horticultural oil. The efficacy of treatment methods was assessed and the results were used to create guidelines for the management of hemlocks at the Arboretum. The guidelines describe an integrated approach, relying on scouting and the targeted use of chemical controls, to maintain tree health while minimizing undesirable effects of pesticides. (126)

**Bender, Courtney\*, Cristina Cardenas\*, Sarah Klein, and André P. Walther.** Cedar Crest College, Allentown, PA 18104. *Replication Protein A phosphorylation regulates cell cycle progression in the presence of damaged DNA or defective microtubule spindles in Saccharomyces cerevisiae*

– Cellular DNA double-strand breaks (DSB) lead to the establishment of the G2/M DNA damage checkpoint, while the presence of damaged microtubule spindles during mitosis activates the Spindle checkpoint. These checkpoints allow repair pathways to function and prevent daughter cells from receiving damaged components in both humans and yeast. The single-stranded DNA binding protein Replication Protein A (RPA), which is phosphorylated in response to DNA damage and during mitosis, has been implicated in checkpoint activation. To investigate the effects of RPA phosphorylation on the G2/M and spindle checkpoints, phosphorylated amino acids of RPA were mutated in *Saccharomyces cerevisiae*. A single DSB was induced to activate the G2/M checkpoint or Benomyl was used to inhibit spindle formation to activate the spindle checkpoint. Progression through the cell cycle was monitored microscopically for 24 hours. Mutated RPA strains could establish the G2/M checkpoint in the presence of damage, but had differing effects on turning off the checkpoint. We also have preliminary evidence of a genetic connection between RPA and several spindle checkpoint genes in response to damaged spindles. Taken together our results demonstrate that RPA phosphorylation plays a role in releasing cells from the G2/M checkpoint and in contributing to the Spindle checkpoint. (152)

**Bilka, Rachel H.\*, Amy C. Krist, and Edward P. Levri.** Division of Math and Science, Penn State-Altoona, Altoona, PA 16601. *Mass-length regressions for different clones of the New Zealand mud snail (*Potamopyrgus antipodarum*)* - The New Zealand mud snail, *Potamopyrgus antipodarum*, is an invasive species that has spread worldwide including populations in the Laurentian Great Lakes and the western United States. The purpose of this study was to examine the biomass of an invasive clone and New Zealand native clones by analyzing the mass-length relationship. Twelve native clones were obtained from different lakes in New Zealand, and one invasive clone from the Great Lakes was obtained from a stream in shallow lotic waters near Lake Ontario. For each clonal popu-

lation, body length, organic mass, and ash-free dry mass (AFDM) were measured. The body length and AFDM was plotted for each population, and a mass-length regression equation was determined. It was found that mass increases with length exponentially for all populations. A preliminary analysis of the data suggests that ploidy and population do influence the mass-length relationship. (56)

**Booterbaugh, Aaron\* and Ahmed Lachhab.** Susquehanna University, Selinsgrove, PA 17870. *A laboratory-Assembled Resistivity meter and its implementation to identify buried foundation walls* – An electrical resistivity device was assembled and put into practice in a laboratory and in the field to identify the location of foundation walls. In this study, we implement the apparatus to explore the remaining walls of Gustavus Adolphus (GA); a building that was burned at Susquehanna University in 1964. This apparatus was constructed in lab using basic inexpensive electrical and electronic equipments. The electrical resistivity apparatus consists of a deep-cycle 12 volt battery, an AC to DC inverter and two multimeters to measure the potential and the current intensity from 4 Wenner electrodes array via a wireless data transmission system. Several tests were performed on the tabletop bench, producing consistent results when applied to find small bricks structures with different geometrical arrangement buried under a soil formation. The horizontal resistivity profile matches the theoretical apparent resistivity of resistivity versus distance over a vertical interface in a homogeneous material. An array of transects were performed, analyzed and plotted using MATLAB. The 3 dimensional contours of apparent resistivity showed the locations of the buried foundation walls. (107)

**Bove, Daniel J.\*, Kimberly Harle, and Jane E. Huffman.** Northeast Wildlife DNA Laboratory, East Stroudsburg, PA 18301. *A Survey of the Parasites of Coyotes (*Canis latrans*) and Red Foxes (*Vulpes vulpes*) in Pennsylvania based on Fecal Analysis* - During the 2009-2010 trapping and hunting season in Pennsylvania, fecal samples were collected from 80 red foxes (*Vulpes vulpes*)

and 66 coyotes (*Canis latrans*). Feces was collected and preserved in 10% neutral buffered formalin and stored at room temperature until analysis. All fecal samples were processed using standard centrifugation concentration flotation techniques. Ova, oocysts, and larvae were identified by morphologic characteristics. Prevalence was calculated as the ratio of the number of fecal samples infected to the total number examined. Twenty (30.30%) coyotes and 28 (35%) red foxes were infected with at least one species of helminth or protozoan. Five species of nematode and one protozoa species were identified in coyotes and three nematode species and one protozoa species were identified in the fecal samples of red foxes. A comparison between the helminths and protozoan species recovered from red foxes and coyotes was evaluated. (114)

**Braund, Jaelyn \* Alicia Helfrick, and Heather F. Sahli.** Shippensburg University, Shippensburg, PA 17257. *The impact of timber harvest on pollinator visitation and plant reproduction in south central Pennsylvania* -Timber harvest is a regular disturbance in many of Pennsylvania's forests, however the effect of timber harvest on understory plant reproduction has been little studied. As most plants are dependent on insect pollinators for reproduction, disruption of pollinator habitat during timber harvest may have a resulting affect on plant reproduction. We compared pollinator visitation rates to flowers of five native understory plant species in Michaux State Forest at three sites that were logged in the past 15-20 years and three sites that have not been logged for over 100 years. To determine whether plant reproduction in logged and unlogged sites was limited by pollinator availability, we performed hand pollinations on flowers of *Kalmia latifolia* (mountain laurel) and *Chimaphila maculata* (striped wintergreen). By comparing fruit and seed set of hand-pollinated flowers to that of flowers that did not receive supplemental pollen, we tested whether plant reproduction would be increased if plants received more visits by pollinators, and tested whether plant reproduction in

logged sites was more limited by pollinators than in unlogged sites. Finally, we quantified flower abundance of all plants flowering during our study period to determine whether floral rewards differed across logged and unlogged sites. (129)

**Brauning, Dan\*, Andy Wilson, Robert Mulvihill, Mark Niessner, Mike Lanzone.** PA Game Commission, Harrisburg, PA 17110 *Index of Forest Area-Sensitive bird distribution in Pennsylvania*. – We predicted densities of birds listed in the Wildlife Action Plan with the highest forest-area associations determined by positive Gini coefficients of forest-accumulation curves, at 36,181 locations on a regular 1900m grid across Pennsylvania. The top twelve species abundances were ranked 0 through 10 for each species. A zero rank was given for predicted absence, a rank of 1 for those grid locations where predicted abundance was in the bottom decile, and a rank of 10 for grid-locations in the top decile. Hence, each species has the same weighting in the index, regardless of their overall abundance. These ranked scores were summed into an index of forest area-sensitive bird abundance and species richness. The resulting GIS cover layer was created using kriging interpolation on the 1900m grid to generate an estimated coverage for the entire state. The top 10% of the index values of the grid are identified as critical forest bird habitat. (35)

**Brown, Sarah\*, Alyson Sharer\*, and Alyssa Bumbaugh.** Shippensburg University, Shippensburg, PA 17257. *Exploration of invasive Escherichia coli infections in the larval stages of the housefly vector, Musca domestica - Shigella* and the enteroinvasive *E. coli* (EIEC) are invasive enteric pathogens capable of causing dysentery. Within the *Escherichia* genus, at least eleven distinct invasive lineages have evolved. One of these lineages (Group 3) consists of serotypes typically isolated from cases of disease in developing nations. In these areas, there is little to no control of common house fly (*Musca domestica*) populations which could serve as a mechanical means of transmitting the invasive enteric pathogens. Our studies have confirmed that adult house flies can carry the in-

vasive *E. coli* externally and there is evidence to support internal maintenance of the pathogens. It is possible that the internal carriage of the bacteria begins during the larval stage of the lifecycle when there is ingestion of the pathogens from contaminating fecal matter in the growth substrate. Our laboratory model indicates that carriage is both external and internal during the larval stage of the lifecycle. Experiments to determine if there is a difference in carriage rate among the invasive bacterial lineages are ongoing. (178)

**Brubaker, Erica E.\* and Clinton D. Jones.** Mercyhurst College, Erie, PA 16546. *The Enhancement of Extraction Methods of PBDEs from Feline Serum Samples with Reversed-Phase SPE* – Polybrominated diphenyl ethers (PBDEs), used as flame retardants in many consumer products, are thought to be endocrine disruptors that may bioaccumulate in fatty tissues. They have been found in various biological samples such as human breast milk and human and cat blood by other researchers. Increasing the efficiency of extraction methods of PBDEs using reversed-phase solid phase extraction (SPE) from feline serum samples is the purpose of our research. We are spiking 0.5-1.0 mL of feline serum samples, voluntarily provided by local cat owners, with congener PBDE-77 to measure the percent recovery after extraction of the contaminant from the serum. Modifications such as flow rate while loading and eluting the sample and the quantity and type of solvents used for conditioning and elution steps should improve recovery and reproducibility of the analyte. Dichloromethane, toluene, methanol, and deionized water, respectively, are the solvents used to activate the silica packing material inside the SPE cartridge while conditioning it. Gas chromatography-mass spectroscopy (GC/MS) and gas chromatography-electron capture detector (GC/ECD) are being used to determine compound identities and percent recovery. Anticipated conclusions of this research should provide a higher percent recovery of PBDEs from serum samples as we continue modification of the extraction method. (18)

**Bruno, Kelsey\* and Gregory George.** Delaware Valley College, Doylestown, PA 18901. *Population Status of Wintering Vultures in Pennsylvania* -- Pennsylvania has both species of North American vultures, Black Vulture (*Coragyps atratus*) and Turkey Vulture (*Cathartes aura*), although Black Vultures were rare until recent years. Over the past two decades there has been a noticeable increase in vulture populations across Pennsylvania. We investigate both Black Vulture and Turkey Vulture distributions across three physiographic providences (Appalachian Plateau, Ridge and Valley, and Piedmont). Physiographic providences in the state representing <1% of total area were incorporated into their adjacent, more dominant, providence for analysis. The National Audubon Societies' Christmas Bird Count provides a statewide dataset with sufficient longevity to predate Black Vultures expanded distribution into Pennsylvania. All 70 CBC count circles in Pennsylvania's were divided among each physiographic region. Results presented are based on the past 20 years of statewide CBC data. Temporal variation of vulture distributions, by species and physiographic region, were summarized with potential explanations and future implications. (39)

**Busada, Jonathan\* and Angela R. Hess.** Bloomsburg University, Bloomsburg PA. *Investigating the effects of EphA2/ephrin-A1 signaling on aggressive melanoma metastatic characteristics.* - Research has shown that increased expression of EphA2 is correlated to an aggressive metastatic phenotype, including increased migration and vasculogenic mimicry: defined as the ability of metastatic cells to form primitive vasculogenic like networks. EphA2 signaling can be mediated through different signaling pathways; one such pathway is through stimulation by the ligand ephrin-A1. This study tested the hypothesis: aggressive melanoma tumor cells with high EphA2 expression show increased migration and vasculogenic mimicry which will be further enhanced upon the addition of the ligand ephrin-A1. Using an *in vitro* scratch wound assay, we found that cells with high levels of EphA2 were able to close the wound in a 24 hour peri-

od whereas cells with low levels of EphA2 were unable to do so. Moreover, evidence suggests that addition of ephrin-A1 reduces tumor cell migration in the experimentally derived melanoma cell line A375P-10, while not significantly affecting migration in the cell line C8161 which are derived from a metastatic lesion. Taken together these results demonstrate the differences between melanoma cell lines, and that understanding the plethora of phenotypes that cancers can produce is vital to the development of effective treatment options that are needed to treat this deadly disease. (9)

**Busada, Michael A.\* and Angela R. Hess.** Bloomsburg University, Bloomsburg PA. *Analyzing new methods to measure cellular proliferation rates in human melanoma cells.* Malignant melanoma is a serious cancer originating from melanocytes of the skin having increased cellular proliferation. Previously, we demonstrated that highly-aggressive human melanoma cells express EphA2 and are highly proliferative, whereas poorly-aggressive human melanoma cells do not express EphA2 and are not highly proliferative. These data were obtained using a hemacytometer and microscope. This laborious and time intensive method needed improvement. Thus, we investigated the use of the Vybrant® MTT Cell Proliferation Assay Kit from Invitrogen Life Technologies. This assay measures cellular proliferation through activity of cellular enzymes, located in the mitochondria, that reduce MTT (3-(4,5-dimethylthiazol-2-yl), to insoluble purple colored formazan, which is dissolved using an acidic buffer. The absorbance at 570nm, is directly related to the number of cells per well; thus, allowing the rates of proliferation to be determined. The 96-well format of the MTT assay allowed for increased replicates and accuracy, while reducing the time needed to perform a proliferation assay. This method demonstrated similar proliferation rates compared to previous cell counting assays and suggests that this 96-well MTT assay produces reliable and consistent results in a short amount of time, and can replace the long and labor intensive cell counting assay currently used. (10)

**Calomeni, Alyssa\* and Megan Rothenberger.** Lafayette College, Easton, PA 18042. *Environmental characteristics and plankton dynamics of Raritan Bay, a eutrophic estuary* – Monitoring studies of plankton biomass and species composition in relation to environmental parameters can provide an important record of the effect of human activities on the structure and functioning of coastal ecosystems. The objectives of this study were to examine natural relationships between plankton species composition and environmental parameters in Raritan Bay and to use *in situ* grazing experiments to determine whether differential zooplankton grazing may be contributing to increased success of noxious algal species. Water quality data and samples for analysis of chemical (ammonium, nitrate, soluble reactive phosphorus, silicon, and ferrous iron) and biological (chlorophyll a, phytoplankton and zooplankton species) parameters were collected on a monthly basis at six sites in the Raritan Bay from April to November 2010. Responses of phytoplankton community composition to enhanced zooplankton grazer densities were measured using *in situ* experiments in July and September 2010. Nitrate and soluble phosphorus concentrations are forty and three hundred times higher, respectively, than concentrations reported in the literature fifty years ago. Phytoplankton and zooplankton assemblages were strongly related to temperature and water transparency, with expected seasonal changes in species concentration. Results of the grazing experiments indicated that zooplankton select against consumption of spiny, colonial, and potentially noxious algae. (57)

**Campbell, J. Michael\*.** Mercyhurst College, Erie, PA 16546. *Is climate change precipitating a biological meltdown in the Lake Erie Basin?* – Documented changes in seasonal thermal regimes of lakes in Great Lakes Basin, including Lake Erie, track effects of long-term and recent climate warming. Advancement of milder conditions in the lakes appear to have facilitated infiltration by the sea lamprey and alewife. Accelerated warming in the past thirty years coincides with a “meltdown scenario” involving Ponto-Caspian invaders --

zebra and quagga mussels and round goby -- in Lake Erie. These species have been implicated as key elements of ongoing outbreaks of Type E avian botulism in the lakes. Future invasive threats in the Lake Erie basin that may be facilitated by continued climate warming include the Asian carp, hemlock woolly adelgid, and Asian clam. A model for advancing state-level conservation planning to deal with the tandem threats of invasive species and climate change will be described. (2)

**Campbell, Laurel\*, Justin Wissler, and Pablo R. Delis.** Shippensburg University, Department of Biology, 1871 Old Main Dr. Shippensburg, PA 17257. *Some Life History Traits of the Spring Peeper (*Pseudacris crucifer*) in Cumberland County, South Central Pennsylvania.* - The Spring Peeper (*Pseudacris crucifer*) is a common spring breeding frog in Northeastern United States. The life history traits of this inconspicuous frog are however poorly understood in Pennsylvania, and specifically in the South Central region. In March of 2010, using night surveys, we collected, by hand and took to the laboratory, 12 amplexing pairs from Michaux State Forest, Cumberland County, Pennsylvania. Minimum SVL at reproduction was 27 mm for females and 21 mm for males. The average SVL of females was 16% larger than that of their male mates. The average clutch size was 400.25 eggs while the maximum was 887 eggs. In our sample, clutch size did not show any clear relation to female SVL. The average fertility rate was 9.7% and the maximum was 42.8 %, with 3 out of the 11 clutches having 0% fertility. The information collected in this research will be compared to future year surveys at the same location and to data from other populations. This future comparative study will give us a deeper insight onto the life history traits and biological fitness of Spring Peepers. This will help us understand better their population status and trends in South-central Pennsylvania. (64)

**Campbell, Mike. J, and Robert L. Crowe\*.** Mercyhurst College, Erie, Pa, 16546. *Preliminary experimentation of an aeroponic algal growth apparatus for CO<sub>2</sub> enrichment* - Aeroponically generated algal biomass from wastewater is being tested by Erie's Renewergy Inc. as a means of advancing profitable organic byproducts and nutrient removal. Exactly how this system processes target compounds is unknown due to the temporal variability of the microbial communities that inhabit this system. With support of a grant from Pennsylvania Infrastructure Technology Alliance (PITA), an experimental apparatus has been constructed to allow controlled addition of CO<sub>2</sub> and phosphorus to mixed algal inocula on wastewater-saturated aeroponic substrates. The apparatus allows measurement of biomass production and bacterial biofilm development with varying nutritional regimes and algal inocula sources. We will present data from the preliminary experiments with the apparatus, and share findings obtained during the trouble-shooting phase of research. (105)

**Cheehan, Anthony, Matthew Haas, George Sworen, and Kenneth Klemow.** Wilkes University. Wilkes-Barre, PA 18766. *Inhibition of woody colonization on a reclaimed anthracite mine: seed rain and seed bank dynamics* - Mine-lands reclaimed by grasses/legume mixtures resist tree invasion, thereby creating states of arrested succession in the northeastern US. Poor tree colonization can result from lack of seed rain, poor seed germination, or poor seedling survival. In this project, we investigate whether the lack of tree colonization on a reclaimed anthracite mine site near Wilkes-Barre PA is due to insufficient seed rain. We deployed 21 seed traps along five parallel transects each extending up a hill within the reclaimed mine to a remnant forest in fall 2010. Seed banks were concurrently assessed by obtaining thirty 10" x 8" x 1" deep soil samples from the reclaimed mine. Samples were placed in aluminum pans in a greenhouse, and watered periodically. Seedling emergence within the pans was subsequently monitored. Examination of the seed traps in December revealed no tree seeds, regardless of distance from

the forest. Flushes of seedlings were observed in each pan. However, all were of herbaceous weedy species such as *Daucus carota*, *Erigeron* sp., and *Solidgo* sp. No tree seedlings were noted. The data collected to date suggest that poor tree colonization results from lack of seed rain, though further year-long investigation is warranted. (130)

**Choi, Young-eun\*** and **Amy J. Reese** Department of Biological Sciences, Cedar Crest College, Allentown PA, 18104. *Yeasts under stress: Are Rhodotorula more tolerant to UV than both pathogenic Cryptococcus neoformans and the model yeast Saccharomyces cerevisiae? - Rhodotorula species are carotenoid-containing yeast isolated from environmental sources. During the last two decades, species from this genus have emerged as opportunistic pathogens, particularly in immunocompromised patients. Currently, there is little information available about their fungal biology. It appears that Rhodotorula species have small polysaccharide capsules; such capsules are known to be the main virulence factor of the better-studied Cryptococcus neoformans. Our goal is to generate an acapsular strain of Rhodotorula in order to further study the interaction between cells and capsule, and to determine if the capsule binding mechanisms are similar to those found in C. neoformans. We are using ultraviolet (UV) light in order to generate mutant strains of Rhodotorula. In comparison to Saccharomyces cerevisiae (baker's yeast), C. neoformans is more tolerant to UV light. Our preliminary data suggests that our laboratory strain of Rhodotorula is at least as tolerant to UV levels as C. neoformans. While melanin (a dark pigment) is known to protect C. neoformans from UV levels, our conditions are non-melanizing. Therefore, we are currently investigating the roles that capsule and carotenoids play in protecting these cells from UV light. Information about Rhodotorula biology may be helpful in future clinical treatment protocols and anti-fungal design. (170)*

**Chun, Andrew\*** and **Megan Rothenberger**. Lafayette College, Easton, PA 18042. *Assessing the quality and availability of Geographic Information System (GIS) data for point and non-point sources of nutrients and pollutants in the Raritan River Basin – A water quality monitoring study begun in 2010 by Lafayette College students in the Raritan Bay has revealed that nitrate and soluble phosphorus concentrations are forty and three hundred times higher, respectively, than concentrations reported in the literature for this system fifty years ago. Published information on long-term land use changes and sources of nutrients and pollutants within the Raritan River Basin (RRB) are lacking. The objective of this study was to synthesize and integrate available land cover data, including land use data beyond general land cover grids, for the RRB into a central, computerized database and to use GIS to examine the distribution of these pollution sources across the RRB and increase in their density over the past decade. There are currently 579 wastewater treatment plants, 61 superfund sites, and 1907 brownfield sites within the RRB, and, from 1990-2000, urban and residential land cover increased by 9.47 mi<sup>2</sup>. The highest concentration of these pollution sources and urban land cover changes are located in Middlesex County surrounding the mouth of the RRB. One surprising result of this research effort is the lack of accurate information available to the general public and the apparent lack of communication among government agencies. (103)*

**Chwiecko, Brian<sup>1\*</sup>**, **Lawrence Fredericks<sup>1\*</sup>**, **Terry Weller<sup>1\*</sup>**, **Matthew Junker<sup>1</sup>**, and **Carsten Sanders<sup>2,3</sup>**. <sup>1</sup>Kutztown University, Kutztown, PA 19530; <sup>2</sup>University of Pennsylvania, Philadelphia, PA 19104; <sup>3</sup>Harrisburg University, Harrisburg, PA 17101. *Novel activation mechanism of programmed cell death via interaction of CCHL (cytochrome c heme lyase) with IAP (inhibitor of apoptosis) - Apoptosis (programmed cell death) is a process of controlled cellular self-destruction, which can be triggered by the release of certain mitochondrial proteins into the cytosol. CCHL (cytochrome c heme lyase), an enzyme essential*

for cytochrome *c* biogenesis in the mitochondrial intermembrane space, has recently been implicated to diminish the activity of IAP (inhibitor of apoptosis protein). The function of IAP is to keep a group of pro-apoptotic cysteine proteases (caspases) de-activated. The cytosolic effect of CCHL on IAP may result in caspase activation and hence apoptosis. To biochemically test whether this effect of CCHL towards IAP is based on physical association of these components, a 6xHis-tagged yeast CCHL and a GST (glutathione-S-transferase)-tagged mammalian IAP were co-expressed in *Escherichia coli*. Both proteins expressed to high levels. Immunoblot data demonstrated that CCHL co-elutes with affinity-purified IAP, supporting the hypothesis of direct CCHL-IAP association. These results were confirmed with a Strep-tagged yeast CCHL. A similar protein-protein interaction is currently being tested with tag-fused human IAP and CCHL derivatives. Furthermore, we will examine whether CCHL-IAP association is sufficient to activate apoptosis using purified caspases and a protease-specific assay. (163)

**Cifra, Nicole\*, Laura Stevens\*, and Jessalee Wantz, Frederic J. Brenner.** Grove City College, Grove City, PA 16127. *Enhanced Killing of Metastatic Tumor Cells with Combinations of Natural Compounds Resveratrol and Quercetin* – This study tests presumed antioxidant effects of natural compounds resveratrol and the flavonoid quercetin on tumor growth. Both are found in a variety of foods, but most notably in the skin of red grapes. The metastatic mouse cell line, T4-PA, were grown and treated with resveratrol ranging in concentrations from three to 300  $\mu\text{M}$ , quercetin ranging from .5  $\mu\text{M}$  to 150  $\mu\text{M}$ , and combinations of both compounds. Cell counts were recorded daily, over the course of four to six days, using gridded plates and photographs of six pre-determined 2 mm square sections of each plate. Average cell counts were analyzed and plotted vs. days of treatment. Results reveal resveratrol and quercetin independently inhibit T4-PA growth in a dose-dependent manner. It was also observed that these two compounds have a synergistic effect, when present in a physiologi-

cal range, on the inhibition of tumor cell growth. Normal NIH Swiss cells treated under the same conditions showed minimally affected cell growth. Studies are underway to include microarray analysis of mRNA from the treated cells to determine which genes these compounds significantly affect. These observations may support the inclusion of these compounds in the daily diet to prevent tumorigenesis. (156)

**Clark, Falon\*, Laura F. Altfeld, and Brad E. Engle.** Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201. *A Comparative Analysis of the Effects of Different Wavelengths of Light on the Growth Rate, Pigmentation, and Behavior of Carassius auratus and Danio rerio* – The purpose of this experiment was to determine if either *Carassius auratus* or *Danio rerio* exhibits phenotypic plasticity in response to the light conditions under which they are living. To test this, the two fish species were maintained under one of four different light conditions, red, blue, green, or yellow, and growth rate, pigmentation, and behaviors were monitored. Initial weights and length measurements were determined for baseline data prior to light exposure. Digital images were also taken pre-treatment to determine the intensity of pigmentation prior to the experiment. The fish were then exposed to their lighting treatments for seven weeks on a 12:12 light cycle. Over the course of the seven weeks, daily behavioral data was collected using an ethogram. At the end of the seven week treatment period, digital images were again taken of the fish, along with final weights and lengths. Statistical analysis is being performed to determine if one wavelength of light has more significance over another in affecting any aspect of the fish's behavior, growth rate, or pigmentation. (59)

**Corbin, Clay E. and Lauren K. Lowenberger\*.** Bloomsburg University, Bloomsburg, PA 17815. *Bluebird skeletal morphology: a phylogenetic thrush or a functional flycatcher?* – To understand ecological traits of organisms better, one can study them from two, not necessarily mutually exclusive

perspectives: how the traits evolved and their current adaptive utility. In birds, foraging behavior and associated morphological traits generally are explained by a combination of adaptive and phylogenetic predictors. This may be especially the case in the flight skeleton, which is under well known functional and phylogenetic constraints. Our question is whether clustering of species in the skeleton-space reflects foraging ecology or phylogeny. To test this, we needed two clades, one with a mixture of sit-and-wait and active foraging modes and one with more canalized foraging behaviors. Hence we measured nine skeletal characters of the flight skeleton for 270 individuals across 19 species that fell within three general categories, flycatcher, bluebird, or thrush. We used univariate and multivariate techniques to characterize the morphologies and test for ecomorphological clustering. When body size and phylogeny are considered, the three bluebird species and Townsend's solitaire clustered with the ecologically similar flycatchers rather than with their turdine relatives. Hence, even in the face of phylogenetic constraints, the flight skeleton of birds reflects their foraging (ecological) utilization. (117)

**Coxe, Robert\***. Delaware Natural Heritage and Endangered Species Program, 4876 Hay Point Landing Road, Smyrna, DE 19977. *Mapping horizontal progress of sea-level rise using vegetation communities at Assawoman Wildlife Area, Sussex County, Delaware* –Vegetation communities are the plant expressions of habitats on the ground. Each of the species contained in a habitat prefers particular habitat conditions and can reflect changes in habitat conditions and thus can be used to map changes in hydrology and/or salinity over time. Vegetation communities at Assawoman Wildlife Area in the Inland Bays region of Delaware were interpreted and mapped using historic and current aerial imagery from 1937, 2002, and 2007. Communities from each map produced were then compared as to amount, location, and change from 1937 to 2002 and to 2007. Field observations were made to ground truth the more recent mapping and changes. Using the above comparisons it was

found that Assawoman Wildlife Area, which totals 2,899 acres (1,173 ha), is losing approximately 1.8 acres (0.7 ha) of land a year to water in the 2002-2007 period, a rate that has been increasing since 1937. North Atlantic High Salt Marsh decreased by 187 acres (75.7 ha) and North Atlantic Low Salt Marsh decreased by 172 acres (70 ha), while Coastal Loblolly Pine Wetland Forest increased by 528 acres (214 ha) and Reed Tidal Marsh increased by 86 acres (35 ha) from 1937 to 2007. (5)

**Crowe, Robert, Danielle Long\* and Dr. J. Michael Campbell.** Mercyhurst College, Erie, PA 16546. *Preliminary tests of a new method of producing axenic filamentous algal cultures for biofilm studies* - Freshwater biofilm communities of bacteria and algae have a poorly unexplored interrelationship. Experimentally eliminating the bacterial biofilm would help demonstrate its role in supporting the growth of algae. We are attempting to advance this problem by developing a method to produce axenic cultures from naturally occurring algal biofilms. Antibiotics have been used for this purpose; however, this method is costly and requires prior knowledge of bacteria types within the sample. Borrowing a technique of plant tissue culturing, we tested a method utilizing chlorine bleach. Filamentous algae samples were collected from local streams near Erie, PA and divided into equal portions: a control, and bleach concentrations of 5% and 10%. The treatment and control portions were further subdivided for bleach solution exposures of 1, 1.5, and 2 minutes. Samples were subsequently rinsed with sterile water and aliquots from each sample were inoculated onto a sterile plate of agar to test for the presence of surviving bacteria. The algae from each sample was placed in a sterile liquid media Alga-gro in a sterile test tube and capped. Our findings regarding the effects of bleach treatment on algae viability and reduction of bacteria will be presented. (77)

**Curley, Shannon\* and Terry Master.** East Stroudsburg University, East Stroudsburg, PA 18301. *Population Distribution, Density and Habitat Preferences of the Cerulean Warbler, (Dendroica cerulea), in the Delaware Water Gap National Recreation Area.* The Cerulean Warbler, *Dendroica cerulea*, is a neotropical migrant songbird of conservation concern. The population is in rapid decline on its breeding and wintering range due to habitat fragmentation from human activity. Recent studies indicate their breeding range has expanded into second-growth forests in the northeastern United States where, according to Breeding Bird Surveys, the population is expanding. In spite of this expansion, the population is still in overall rapid decline implying that habitat quality supersedes habitat expansion in importance. The goals of this study were to determine the bird's population and distribution in the Delaware Water Gap National Recreation Area (DEWA) and to compare DEWA vegetation structure with their core range to provide an explanation for the recent expansion. In 2009, 22 singing males were detected and 68 in 2010, almost entirely concentrated in the south-central portion of the park. Densities, however, are lower than expected based on previous preliminary studies. Initial vegetation analyses indicate a preference for canopy gaps and avoidance of Northern Red Oak. (42)

**Cypher, Alysha\*, Richard Londrville, and Bill Zawiski.** Clarion University of Pennsylvania, Clarion Pa 16214. University of Akron, Akron OH 44301. *"Uck! What am I swimming in?!" A Stream Comparison using Biochemical Indicators.* – Biochemical markers in aquatic organisms are commonly used as a sensitive indicator of stream health. I compared biochemical indicators of Stoneroller Minnows from three streams in northeast Ohio; these streams vary in "health" as assessed by the Ohio EPA. Stoneroller Minnows, *Camptostoma anomalum* was chosen because they are abundant, easy to identify and, as bottom dwellers, they come into contact with benthic toxins. The streams chosen for comparison were Tinker's Creek, Furnace Run, and Yellow Creek. According

to the Ohio EPA's Qualitative Habitat Evaluation Index, Tinkers Creek in Cuyahoga County is a "polluted and stressed stream," while both Furnace Run and Yellow Creek are relatively high quality streams. The antioxidant enzyme catalase and the hormone cortisol were chosen as indicators of stress whose levels were compared among fish from each stream. I hypothesized that if Tinker's Creek is a lower quality stream than both Furnace Run and Yellow creek, then catalase and cortisol levels would be higher in fish from that stream. (100)

**Czarnecki, Greg\*.** Pennsylvania Department of Conservation and Natural Resources, Harrisburg, PA 17105. *Adapting to Climate Change in Pennsylvania – A Role for the Pennsylvania Academy of Science? – Pennsylvania's Climate Change Action Plan,* which was mandated by Act 70, recommended that in addition to mitigation, adaptation strategies also be developed to address climate change. Consequently, a team comprised of state agencies, NGOs, industry, and academia have developed a climate change adaptation plan that focuses on four areas — natural resources, infrastructure, human health, and tourism and outdoor recreation. The natural resources component identifies the risks and vulnerabilities of forests, agriculture, freshwater systems, and plants and wildlife. They include shifts in species composition; interaction of stressors; barriers to landscape connectivity; changes to stream and river flows; and a lack of genetic diversity. Recommended responses to these threats include research in several areas to which PA Academy of Science members could contribute. They include understanding how climate change may affect soil biology, chemistry, and physics; participating in an integrated monitoring system focused on at-risk species and habitats; better understanding species habitat needs; developing predictive migratory models; and clarifying how climate change interacts with other environmental stressors. (1)

**Dager, Megan\*, Ghaith Ibrahim, John Hranitz, and Cynthia Surmacz.** Bloomsburg University, Bloomsburg, PA 17815. *Establishing Standard Conditions for the Measurement of Stress Responses in the Bioindicator Lumbriculus variegatus* – The blackworm, *Lumbriculus variegatus*, is used as a bioindicator to monitor the health of aquatic ecosystems because it responds to various environmental stressors and displays readily observable biological responses such as tactile responses and pulse rate. Our overall aim is to correlate behavioral and physiological measures of stress with the cellular stress marker, Heat Shock Protein 70 (HSP70). Initial experiments have shown that stresses such as heat shock and chemical pollutants increase HSP70 levels in worms. Our objective in this study was to establish standardized conditions for worm maintenance and analysis of HSP70 concentrations. We examined the effects of acclimation, aeration and the use of protease inhibitors during homogenization on HSP70 concentrations. HSP70 concentrations were not affected by acclimation times ranging from 1 to 4 weeks ( $P=0.818$ ). The HSP70 stress response was absent in aerated worms, but was present in non-aerated worms ( $P=0.005$ ). Addition of a protease inhibitor cocktail (Roche) showed a 31% increase in HSP70 levels ( $P=0.005$ ). In future studies worms should be maintained under non-aerated conditions with the use of protease inhibitors during analysis regardless of acclimation time. (62)

**Dally, John\*, Phat Nguyen, Courtney Spelger, Hannah Laimer, Dawn Gregor, Kyra Phair, Priscella Payne, Valerie Kalter and Linda S. Gutierrez.** Department of Biology, Wilkes University, Wilkes-Barre, PA. *Expression of Thrombospondin 1 in a Rat Model of Polycystic Kidney Disease* - Polycystic kidney disease (PKD) is a disorder causing clusters of fluid-filled cysts leading to kidney failure. PKD is a genetic disease that can be inherited as autosomal dominant (ADPKD) or autosomal recessive (ARPKD). Thrombospondin 1 has been shown to regulate migration, proliferation and survival through the interaction with proteoglycans and integrins and its expression has been

observed in animal models for kidney diseases. In these models, TSP-1 expression in the kidney was detected before the development of fibrosis indicating that this protein might be an early predictor of renal fibrosis. In this study, we seek to identify a connection between PKD disease and TSP-1 by using the polycystic kidney (PCK) rat model. PCK rats ( $n=6$ ) were sacrificed and kidneys harvested for histological evaluation. Normal Sprague-Dawley rats ( $n=5$ ) served as positive controls. As expected, PCK kidneys displayed cysts of different sizes in cortex and medulla. TSP-1 expression was detected by immunohistochemistry and observed in the immediate pericyclic renal stroma. Epithelial cells lining the cysts were also strongly positive. However, glomeruli and renal tubules were negative in both groups. The matricellular expression of TSP-1 in PCK rat kidneys suggests that this protein might be involved in the pathogenesis of PKD. (160)

**De Palma, Ryan\* and Jeramia Ory.** King's College, Wilkes-Barre, PA 18711. *The effect of modified copper-sensing elements in the regulated CTR4 promoter system of Cryptococcus neoformans* – *Cryptococcus neoformans* is an opportunistic fungal pathogen that is ubiquitous in soil worldwide, and lethal to immunocompromised individuals if infected. A major virulence factor is the production of the extracellular membrane coating, melanin. Melanin is an insoluble polymer, synthesized from DOPA by a copper dependent laccase enzyme. To manage essential copper uptake from the environment, *C. neoformans* uses a high-affinity copper-transport membrane protein called *CTR4*. The transcription factor Cuf1p regulates the expression of *CTR4* in response to varying concentrations of copper by binding to Copper Sensing Element (*CuSE*) sequences. Characterization of these upstream *CuSE* sequences is the primary focus of our research. While the canonical *CuSE* is not known in *C. neoformans*; there are five putative upstream sequences that are thought to contribute to the expression of *CTR4*. However, the extent to which each sequence contributes to *CTR4* expression is not clear. The objective of the project is to determine the degree to which each region affects

the expression of *CTR4*. Each upstream *CuSE* will systematically be deleted by mutagenesis to find their contribution to the expression of *CTR4* in varying concentrations of copper by utilizing a reporter gene, *gusA*, to verify and record the expression through a  $\beta$ -glucuronidase assay. (174)

**Dennis, Megan\*, Laura F. Altfeld and Deborah S. Austin.** Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201. *Comparing Vitellogenin Induction by 17 $\beta$ -Estradiol in Male Danio rerio Through a Tritrophic Bioaccumulation Model and a Bioconcentration Model* - The steroid hormone 17 $\beta$ -estradiol (E2) is excreted into the water by humans and is not filtered by sewage treatment plants. Its presence in the aquatic ecosystem is causing a disruption of the functioning ability of many aquatic organisms. Being lipophilic allows 17 $\beta$ -estradiol to be stored in primary producers, giving E2 the ability to possibly bioaccumulate up the food chain. The chemical E2 can also bioconcentrate in aquatic species, specifically fish, which implies it can be accumulated through non-dietary routes. A tritrophic model, using diatoms (*Navicula radiosa*), daphnia (*Daphnia pulex*), and zebrafish (*Danio rerio*) will serve to evaluate the bioaccumulation and potential trophic transfer by exposing diatoms to E2. A second bioconcentration model will determine the ability of E2 to concentrate in *D. rerio* via direct exposure of water treated with E2. In both of these experiments, quantification of vitellogenin (Vtg) production by *D. rerio* will be compared between treatments using an ELISA. It is expected that elevated Vtg levels will be found in the *D. rerio* treated with E2, in both models. The results obtained will be analyzed by a multi-variable ANOVA and Bonferroni post hoc. (60)

**Dhillon, Jess-Karan\*, and David R. Singleton.** York College of Pennsylvania, York, PA 17403. *Prion Propagation in Response to Temperature and Osmotic Stress* - Prions are proteins which can switch between a normal and a pathogenic conformation, and are associated with several neurodegenerative diseases in mammals. Homologs of

these proteins have been described in *Saccharomyces cerevisiae*, one of which encodes the SUP35 gene product that can propagate as a prion called [PSI<sup>+</sup>]. Molecular chaperones have been shown to be used in the disaggregation or aggregation of the yeast prion and have been shown to respond to various forms of stress. To further address the role of chaperones in affecting the presence of the misfolded form of the prion, single gene deletion mutants in a family of related heat shock protein chaperonins were examined for the rescue of the [PSI<sup>+</sup>] phenotype by exposing yeast strains to a variety of temperature and osmotic stresses. Initial characterization of prion propagation in the single knockout mutants under temperature and osmotic stress conditions indicated the presence of occasional colonies that appeared differently using a method known as red-white sectoring. If stressors such as these affect molecular chaperones in such a way as to cause disaggregation of prions, potential treatments for mammals may follow. (168)

**Dickinson, Courtney\* and Cynthia Keler.** Delaware Valley College, 700 E. Butler Ave, PA 18901. *The Affect of Plant Growth Promoting Bacteria on Sun Flowers in Varying Salt Concentrations* - This project will focus on finding out if plant growth promoting bacteria will increase salt tolerance in sun flowers. The experimental plants will be inoculated with either *Mycobacterium flavescens* or *Acimetobacter* isolated in the Microbiology lab class at Delaware Valley College during the fall 2010 semester. *Mycobacterium flavescens* increased growth 162% in cowpeas and *Acimetobacter* increased growth 100% in corn seeds. Control plants will not have any bacteria added to the soil or *E. coli* added to the soil because that bacterium does not promote plant growth. A week after the plants have been inoculated with the bacteria, the plants will be watered with the varying concentrations of salt, .5%, 2%, 5%, 7% and 10% , three times to ensure that the soil retains that amount of salinity.

The effect of the plant growth promoting bacterium will be compared to the control plants by measuring the plant height, if it flowers, the weight of the above ground biomass and the general appearance of the leaves of the sun flowers. **(136)**

**Diegelman-Parente, Amy and Ashley Westgate.\***

Mercyhurst College, Mercyhurst, PA 16546. *Rational Design of a Biological Sensor for ATP* – ATP is one of the most important molecules in our body. In addition to serving as one of the main building blocks for our genetic blueprint, ATP transports chemical energy from metabolic processes and serves as an important chemical messenger in cellular signaling. Detection of cellular concentrations of ATP has typically been accomplished using protein-based bioluminescence assays. Selection experiments have also identified DNA aptamers that bind to ATP with high affinity (6  $\mu\text{M}$ ). However, the detection ranges of both of these systems are non-variable, and for DNA aptamers are outside of the desirable physiological range for ATP (1 – 10 mM). Previous research in our laboratory has shown the ability to correlate thermodynamic stability of an alternatively folded structure with binding affinity. This project aims to design a physiologically relevant biological sensor for ATP using these thermodynamic principles. By designing an off-pathway alternatively folded conformation we can allow modulation of the  $K_D$  to transform this aptamer sequence into a sensor in the desired physiological range. Characterization of these binding events has been performed using both circular dichroism and calorimetry using high-throughput isothermal titration calorimetry (HT-ITC) and high-throughput differential scanning calorimetry (HT-DSC). **(146)**

**Diegelman-Parente, Amy and Gregg Robbins-Welty.\***

Mercyhurst College, Mercyhurst, PA 16546. *The Use of High-Throughput Isothermal Titration Calorimetry (HT-ITC) and High-Throughput Differential Scanning Calorimetry (HT-DSC) to Investigate the Effects of Ligand Binding on DNA Aptamers* – The ability to correlate thermodynamic stability of an alternatively folded

structure with binding affinity is a central theme of this research. Hundreds of selection experiments have been done to identify RNA and DNA aptamers that bind a wide range of molecules. Designing an off-pathway alternative folded conformation for any of these aptamers can allow modulation of the  $K_D$  to transform these aptamer sequences into sensors in a desired range. Thus, future directions of this powerful yet simple project are nearly limitless. HT-ITC is a physical technique that can be used to measure the thermodynamic parameters of molecular interactions. HT-DSC can be used in parallel experiments to investigate the effects that ligand-binding have on stability of the DNA molecules. Both of these techniques in complement provide a more complete picture of the ways in which alternative secondary structure formation can be used to tune the affinity of RNA and DNA sensors of small molecules. This project aims to use HT-ITC and HT-DSC to further characterize potassium binding to quadruplex sequences previously characterized using CD. In addition, a new DNA aptamer that binds ATP has been designed and preliminary characterization of this interaction has been performed using both HT-ITC and HT-DSC. **(145)**

**Diegelman-Parente, Amy\*.**

Mercyhurst College, Mercyhurst, PA 16546. *Design of a Biological Sensor for Potassium Ions* – DNA quadruplexes are an unusually stable potassium-binding structural motif that has the potential for wide-reaching biological implications. While significant work has been performed towards the general development of these motifs as potassium sensors, little work has been done to rationally design these motifs with predictable, and wide-ranging potassium binding constants. This project aims to correlate the  $[\text{K}^+]$  required for G-quartet formation with the stability associated with an alternative hairpin structure. In an effort to facilitate such a rational design of ligand-binding oligonucleotides, we used nearest-neighbor parameters to derive a set of DNA quadruplexes whose binding constants were determined by potassium titration experiments and circular dichroism. Our findings demonstrate

that free energy values for both of these processes (hairpin to quartet formation and stability of hairpin structure) are linearly correlated, such that a DNA quartet-forming sequence can be rationally designed to selectively bind  $K^+$  at any desired  $K_D$ . (19)

**Dodd, Raymond\*** and **Howard P. Whidden.** Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA 18301. *Dietary Overlap Among Coyotes, Red Foxes, and Gray Foxes in Northeastern Pennsylvania* – There are three sympatric canids in Pennsylvania, the coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and gray fox (*Urocyon cinereoargenteus*). Their distributions overlap broadly, and the three species compete for prey. The coyote is thought to be a recent arrival to the Northeast, and coyotes will sometimes prey on foxes. To assess dietary differences between these three species, we examined gut contents from carcasses obtained from trappers and hunters or found as road kills. Preliminary analysis of coyote stomachs (n=5) found white-tailed deer (*Odocoileus virginianus*) making up the majority of the contents, with meadow vole (*Microtus pennsylvanicus*) and corn also present. The gray fox stomachs (n=5) contained snowshoe hare (*Lepus americanus*), ladybird beetles (Coccinellidae), and domestic chicken (*Gallus domesticus*). The red fox stomachs (n=4) contained meadow vole, eastern cottontail (*Sylvilagus floridanus*), short-tailed shrew (*Blarina brevicauda*), and hairy-tailed mole (*Parascalops breweri*). (71)

**Dolney, Timothy\*** and **Richard Flarend.** Penn State University – Altoona College, Altoona, PA 16601. *Using LIDAR data to identify abandoned coal mines for the construction of a seasonal storage pit* – This research presents the use of GIS to identify potential locations of the Seasonal Storage of Solar Heating (S<sup>3</sup>H) within the state of Pennsylvania. The S<sup>3</sup>H utilizes a large pit to store thermal energy collected during the warm months for later use in the cold months. To maximize its overall efficiency, S<sup>3</sup>H must be built where several locational parameters occur in unison: abandoned mine

lands (AMLs), institutions, soil type, and land use. These parameters were mapped using GIS with potential locations identified through the applications of neighborhood statistics. These locations were further defined by incorporating LIDAR (Light Detection and Ranging) data into a hillshading process. In the end, site visitations were performed to ultimately identify potential locations. (108)

**Drago, Caroline\*** and **Jane E. Huffman.** East Stroudsburg University, East Stroudsburg, PA 18301. *Molecular Identification of Wild Game DNA from Maggot Crops* – DNA analysis of maggot crop contents can reveal their last meal. Successful analysis would help state game agencies identify what a maggot had been feeding on and aid entomologists in interpreting evidence used to determine post-mortem interval. In this study, maggots of the blowfly *Calliphora vomitoria* were raised on the livers of various wild game species from Pennsylvania and collected at all maggot instar stages. The DNA of these game species was extracted from the crops of the maggots and compared to the DNA of the livers they fed on. The extracted DNA was analyzed to determine species, individual profiles, and gender. Successful results were obtained from all game species at all maggot instar levels. As most wildlife crime occurs outdoors, the ability to identify a maggot's last meal has the potential to assist wildlife conservation officers in the matching of samples to a crime scene where no tissue might be left over due to consumption by maggots. (181)

**Eckman, Edward\*** and **Delis, Pablo R.** Shippensburg University, Department of Biology, 1871 Old Main Dr. Shippensburg, PA 17257. *Survey of snakes in natural islands in an urban and agricultural landscape directly flanking the Shippensburg University Campus* - Snakes are a valuable ecological resource, serving both as predators and prey in ecosystems. However, little is known about snakes because of their secretive nature. Frequently what we know about them are misconceptions and myths. Snakes are threatened by human disturbances, contributing to the current biodiversity crisis. This research collected baseline

data on snake populations in areas adjacent to the Shippensburg University campus, Cumberland County, Pennsylvania, which is flanked by residential buildings and agricultural lands. We used cover boards and opportunistic survey techniques from August to October of 2010. Thirteen individuals belonging to three species were found during our sampling. The Common Garter Snake, *Thamnophis sirtalis*, was the most abundant. The Northern Water Snake, *Nerodia sipedon*, and the Eastern Rat Snake, *Scotophis alleghaniensis*, were also captured. Of eleven *T. sirtalis* captured, six were juvenile. Number of captures per sampling event declined, by October, approaching the beginning of hibernation. We found 3 (21%) out of the 14 potential species expected to inhabit this area. These three snakes are considered generalist and common in disturbed areas. Our current goal is a long-term survey to provide us with reliable information on the status and trends of snake assemblages in disturbed habitats of South-central Pennsylvania. (65)

**Emili, Lisa\***. Penn State Altoona, Altoona, PA. 16601. *A GIS-based model for the rapid assessment of the impacts of land use change on soil and water quality in agricultural watersheds* - Agricultural non-point source pollution, primarily sediment and nutrients, is the leading source of water quality impacts to surface water in the United States. A custom model is being developed using ArcGIS ModelBuilder that will rapidly identify areas within northeastern Illinois test watersheds that may be susceptible to soil erosion and associated nutrient loss. The identification of such critical source areas is essential for mitigation and conservation efforts by individual farmers, agricultural communities and local governments to improve surface water quality in streams of the Illinois-Mississippi River system already impaired due to excess levels of sediment and phosphorus. 58% of soils tested in Illinois had phosphorus concentrations exceeding what is necessary for optimum crop yield. This model will allow key stakeholders to quickly and economically determine the conservation practice or combination of practices (such as conservation cover crops and conservation crop rotations) that

would best reduce sediment and phosphorus losses. This model will not only produce predictive maps, but will also be capable of examining the spatial distribution of soil and nutrient inputs and outputs not just between different conservation practices, but also at varying scales (per field, per watershed, per conservation management unit). (104)

**Ernst, N.T.\* and T. Master. 2011.** East Stroudsburg University, Department of Biological Sciences, East Stroudsburg, PA 18301. *The Louisiana Waterthrush as a Bioindicator of Hemlock Habitat Productivity: a Preliminary Comparison of Hemlock Ravines and Benches* - Stands of Eastern Hemlock (*Tsuga canadensis*) are found along two specific types of headwater streams, those flowing swiftly through narrow valleys (ravines) with steep gradients and those meandering slowly across flat floodplains (benches). All stands are currently declining throughout their range as a result of an introduced insect pest, the Hemlock Woolly Adelgid (*Adelges tsugae*). Hemlock habitat, and its unique biodiversity, could completely disappear in 30 years. Available control methods are either expensive, ineffective and/or need to be repeated every few years. Thus, effective protection can only be practically applied to selected stands. Previous studies indicate the Louisiana Waterthrush (*Parkesia motacilla*) to be a robust bioindicator of headwater stream ecological integrity. Streams were monitored to determine overall habitat quality/productivity using waterthrush territory density, foraging success and reproductive success as evaluation metrics. Preliminary results are reported here, final results will help determine if either habitat type should receive higher priority for application of protection measures. (40)

**Faivre, Amy E., Leia Epstein, Mehveen R. Qureshi, and Amanda E. Rocklyn\*.** Cedar Crest College, Allentown, PA 18104. *Effects of temperature and self-pollen on pollen tube growth in flowers of Christmas cactus (*Zygocactus* sp.)* - Several species of *Zygocactus*, commonly known as Christmas cacti, originate in Brazil but have become popular as house plants worldwide due

to their tendency to flower in late autumn or early winter. Temperature and day length influence bud development and flowering time in these species. We studied the effects of temperature on pollen tube growth in out-crossed flowers of one *Zygocactus* sp. Because in some flowers, there is little distance between stigma and anthers we also tested for self-compatibility. Flowers were hand-pollinated and plants were placed either in an environmental chamber at 12°C or in a greenhouse where temperatures ranged from 24-27°C in the first trial and from 15-23°C in the second trial, with one day dipping to 13°C. Self-compatibility trials were done in the greenhouse. Flowers for temperature trials were collected either 12 or 24hrs following pollination. Self-crossed flowers were left on plants for 2-3 days. Flowers were stained with 0.1% aniline blue stain. The percentage of pollen grains that germinated and the number of pollen tubes that grew into the style were recorded. Comparisons were made between flowers exposed to the two different temperatures. The extent of pollen tube growth for self-crossed flowers was recorded. (131)

**Fathel, Siobhan\* and Ahmed Lachhab.** Susquehanna University, Selinsgrove, PA 17870. *Water analysis in the vicinity of a release point of Marcellus Frac water treatment facility on Susquehanna River* – The Marcellus Shale formation contains extensive natural gas deposits. This formation can be reached through hydraulic fracturing. The flowback water generated from fracturing is treated and released into the environment. Locally, Sunbury Generation, LLC in Shamokin Dam, PA has been treating and releasing fracturing water into the Susquehanna River. This study will investigate the water near the treatment facility and evaluate the water quality in close proximity to the release point. Sondes were deployed upstream and downstream of the treatment plant to measure several physical properties, salt cations and anions. Although, the thermal plume released by the same treatment facility is not linked to the Frac water treatment, it was included to assess its possible affect on the process. Water samples downstream

from the plant show elevated salt levels most probably linked to treated flowback water. The ultimate goal is to develop an understanding of the water quality by continuously monitoring and comparing water samples above and below the plant. (101)

**Firment\*, Chad, Joseph Fiedor, Suzanne Boyden and Shannon Nix.** Clarion University of Pennsylvania, Clarion, PA 16214. *The impact on nutritional composition, metal accumulation and plant growth of vernal alfalfa (Medicago sativa) grown in flyash amended soils* – When coal is combusted, a fine ash called flyash is produced. Chemically, this byproduct closely resembles the coal of origin and has been found to contain many toxic metals. However, studies have shown that flyash can act as a fertilizer for plants when amended to soils. In our study, we attempted to determine the affects that soils amended with increasing concentrations of flyash have on vernal alfalfa (*Medicago sativa*) growth and biomass while also measuring the accumulation of metals and other nutrients in the tissues of alfalfa. The experiment took place over 16 weeks in a greenhouse facility located at Piney Creek Power Plant in Clarion, PA. The design consisted of two sets of 0%, 1%, 4%, and 16% flyash amended soil treatments with 4 treatment replicates for each. During the experiment, plants from each treatment were randomly selected at three time periods and measured for shoot length, root length and total biomass. Dried plant materials were sent to Penn State Agricultural Analytical Lab and analyzed for N, P, K, Na, Mg, Mn, Ca, Fe, Cu, B, Al, and Zn. These data have allowed us determine if flyash-grown alfalfa has notable changes in growth, biomass, nutritional content or metal accumulation. (133)

**Flarend, Richard\*, Tim Dolney, and Jeremy Walsh.** Penn State Altoona, 3000 Ivyside Park, Altoona, PA 16601, *Seasonal Thermal Energy Storage*. A large demand for energy in Pennsylvania is for space heating. Unfortunately, this demand also coincides with low winter solar insolation making traditional solar thermal energy impractical for space heating. However it is possible to collect this

solar energy in the summer and to store it for later use in the winter using a seasonal thermal energy storage system (STES). Existing STES systems have had a variety of problems due to cost, thermal losses, and/or slow thermal time constants of the storage field. This research has focused on designing and locating a potential site for a solar STES system using an abandoned coal mine that solves many of these problems. The design, dynamic simulation, and estimated performance of such a system will be presented. Construction estimates and return on investment will also be presented for a potential site in which a favorable abandoned mine has been found very close to a K-12 school. **(6)**

**Flynn, Megan<sup>1\*</sup>, Kathy Commisso<sup>2</sup>, Larry Hilaire<sup>2</sup>, and Howard P. Whidden<sup>1</sup>.** <sup>1</sup>Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA 18301, and <sup>2</sup>Delaware Water Gap National Recreation Area, Bushkill, PA 18324. *Acoustic Monitoring of Summer Bat Activity in the Delaware Water Gap National Recreation Area – White-nose Syndrome (WNS) has resulted in massive mortalities of hibernating bats since its appearance in 2006. Acoustic monitoring can be used to measure species composition of local populations and spatial and temporal patterns of bat activity. Establishing such baseline data can provide information on WNS spread, mortality rates, and population changes. We used an established protocol of driven transects to monitor bat activity in the Delaware Water Gap National Recreation Area. We mounted an AnaBat II detector on a car roof and drove a 77-mile transect on 12 nights between 1 June and 15 July 2010. We recorded only 87 echolocation calls: 42 in the Big Brown/Silver-haired Bat species group, 19 in the Red Bat/Eastern Pipistrelle species group, 23 unknown high-frequency calls, and 3 unidentified calls. Activity peaked shortly after dusk and again right after midnight. Areas along the Delaware River, including Route 611 in PA and Old Mine Road in NJ, showed the highest activity levels. Bats play important roles in forest ecosystems and severe*

population declines could have significant effects. Our data on bat activity levels after WNS may help to develop bat conservation and management strategies for the Delaware Water Gap National Recreation Area. **(68)**

**Focht, Joshua D.\* and Thomas M. McGuire.** Penn State Abington, Abington, PA 19001. *Regulation of Hsp70 and Hsp32 Gene Expression by Human Chorionic Gonadotropin in Breast Epithelial Cells – The effects of human chorionic gonadotropin (hCG) on the expression of the Hsp70 and Hsp32 stress response genes were studied through RT-PCR analysis in four breast epithelial cell types: MCF-10F, E2, C5, and T4. RT-PCR results show that Hsp70 gene expression is triggered on day 1 in the MCF-10F line, with a gradual decrease on days 2 and 3 evidenced by weakening band strength. Hsp70 expression appears to be present on each day with similar band strength in the remaining cell lines which may suggest that hCG is not directly regulating expression. Hsp32 expression was mainly observed in the T4 line, with a high expression displayed on each day. Like Hsp70, Hsp32 expression in the T4 line may not be the direct result of hCG activity due to a similar banding strength present on each day. A weak Hsp32 signal was observed on day 3 in the MCF-10F line, but further experimentation may be required to verify its significance. Protein expression will be investigated by western blots. Understanding patterns of gene expression and why genes such as Hsp70 and Hsp32 are expressed may help to better explain the apparent anti-proliferative properties of hCG, and further the understanding of tumor progression. **(159)***

**Foreman, Benjamin\*, and Isaac VonRue.** King's College, Wilkes-Barre, PA 18711. *Molecular Weight and Concentration Dependence on the Thermo-reversible Gelation of Polycaprolactone – Our research was focused on developing a better understanding of the thermo-reversible gelation that was observed in samples of polycaprolactone (PCL) dissolved in *N,N*-dimethyl formamide (DMF). Three different samples of PCL with*

molecular weights from 8000 to 17000g/mol were dissolved in DMF with concentrations varying between 10-20% by mass. Visual observations as well as differential scanning calorimetry (DSC) were used to measure the transition temperature from gel to solution. From the DSC data it was determined that the sol-gel transition temperature of PCL-DMF samples increased as the molecular weight of the sample increased. Initial data shows that the sol-gel transition temperature also increases with the concentration of the sample. Through variation of both the molecular weight and the concentration the sol-gel transition temperature was found to vary from 17-26°C. (140)

**Forestal, Gwendolyn\***, **Nicholas Lansberry**, **Megan Schultze**, and **Peter J. Petokas**. Lycoming College, Williamsport, PA 17701. *Body Size, Health Condition, External Appearance, and Sexual Dimorphism in Eastern Hellbenders from North-Central Pennsylvania* – We surveyed for Eastern Hellbenders (*Cryptobranchus alleganiensis*) in a major tributary of the Susquehanna River West Branch in north-central Pennsylvania from May through September 2008-2010. Three hellbender meta-populations were surveyed to obtain information on body size, health condition, external appearance, and sexual dimorphism. We lifted large cover rocks and captured a total of 240 adults and juveniles, and PIT-tagged all individuals >200mm total body length (TBL) as part of a long-term study of population dynamics. Mean TBL and body mass differed significantly between the three meta-populations. Adult females attained a significantly larger body size than males. Male hellbenders exhibited sexual dimorphism through cloacal swelling and paired head swellings during the breeding season (August-September), and this is the first report of head swellings as a sexually dimorphic feature. There were no significant sexual differences in tail length, tail base diameter, mid-abdominal diameter or maximum head width. Melanic pigments (spots/blotches) decreased in size and prevalence with an increase in size and

age. Dracunculid nematodes (*Kamegainema cingulum*) were present subcutaneously from May-June, but were absent July-September. Developmental anomalies and patterns of tissue damage from intraspecific combat are described. (88)

**Frantz, Mack W.\***, **Joe Grata**, **Marja Bakermans**, and **Jeff Larkin**. Indiana University of Pennsylvania, Indiana, PA, 15705. *Developing and Implementing Habitat Management Prescriptions for Golden-winged Warblers in North-central Pennsylvania*. The Golden-winged Warbler has experienced dramatic population declines over the last several decades. Researchers and managers agree that habitat management is the key to the long-term conservation of this species. In 2008, we initiated the Pennsylvania Golden-winged Warbler Initiative. We captured and banded 77 territorial male Golden-winged Warblers and mapped the territories of 114 male Golden-winged Warblers in two study areas from May through June 2008 and 2009. We also conducted habitat sampling within each territory and within adjacent unused territories. Habitat data from used and unused territories were analyzed separately for each study area. Results from 2008 and 2009 were used to create site-specific habitat manipulation prescriptions that were used to guide management on 7, 20ha sites during winter 2009-10. In 2010, we mapped the territories of 79 male Golden-winged Warblers. Five of 7 manipulation plots had 1-2 territorial males in 2010. Simultaneously, we also conducted woodcock surveys on the manipulation plots during the first week of May 2010. We detected between 5 and 11 displaying American woodcock/10ha on the Bald Eagle plots. These findings are promising, in that our results are a good first attempt at purposefully creating Golden-winged Warbler breeding habitat that also benefit other imperiled species. (38)

**Freeman, Colbey\*** and **Rebecca Urban**. Lebanon Valley College, Annville, PA 17003. *Sediment Oxidation Capabilities of Four Aquatic Macrophytes* - Isoetids are submersed aquatic plants with small, stiff rosettes and extensive root systems. These

roots exchange carbon dioxide and oxygen along their entire length, increasing sediment redox potential and affecting sediment biogeochemistry. *Eriocaulon aquaticum* and *Lobelia dortmanna* are archetypical isoetids, and *Eleocharis acicularis* and *Utricularia resupinata* are isoetid-like macrophytes that grow in sediment types and acidic water populated with isoetids. The sediment oxidation capabilities of these four species were compared. Plants and two sediment types were collected from lakes in the Adirondack Mountains. The macrophytes were grown in both sediments, and each sediment type had a bare treatment. Redox potentials and porewater pH levels of the sediment were measured on day 122 and 153, respectively. *Eleocharis acicularis* and *U. resupinata* matched or exceeded the sediment oxidization and porewater acidification observed in treatments containing isoetids. Results for *E. acicularis* were consistent with initial expectations, demonstrating that this species and the isoetids possess morphological and physiological similarities. However, the oxidation by the rootless *U. resupinata* was unanticipated, suggesting that this macrophyte's stems can penetrate the sediment and emulate the isoetids' rhizosphere oxidation. (78)

**Fritz, Kelley\*<sup>1</sup>, Steven Harris<sup>1</sup>, Harry Edenborn<sup>2</sup>, and James Sams<sup>2</sup>.** <sup>1</sup>Clarion University of Pennsylvania, Clarion, PA 16214, <sup>2</sup>National Energy Technology Laboratory, U.S. Dept. Energy, Pittsburgh, PA 15236. *Impacts of Sedimentation from Oil and Gas Development on Stream Macroinvertebrates in Two Adjacent Watersheds of the Allegheny National Forest of Northwestern Pennsylvania - The Allegheny National Forest (ANF)*, located in northwestern Pennsylvania, is a multiuse forest combining commercial development with recreational and conservation activities. As such, portions of the ANF have been heavily logged and are now the subject of widespread oil and gas development. This rapid increase in oil and gas development has led to concerns about sediment runoff from the dirt and gravel roads associated with development and the potential impact on the aquatic biota of the receiving streams. We exam-

ined and compared the benthic macroinvertebrate communities in two adjacent watersheds of similar size and topography in the ANF; the Hedgehog Run watershed has no oil and gas development, while the adjacent Grunder Run watershed has extensive oil and gas development. In Hedgehog and Grunder Run, we collected monthly kicknet samples from riffles and glides at two sites from April to October 2010. At the same intervals, we measured standard water quality parameters, including conductivity and turbidity. Preliminary results have indicated much higher turbidity in Grunder Run, but little difference in the diversity and abundance of benthic macroinvertebrates inhabiting the two streams. (97)

**Fuentes, Samantha\* and Jane E. Huffman.** East Stroudsburg University, East Stroudsburg, PA 18301. *Population Genetics of Pennsylvania and New Jersey Bobcats (*Lynx rufus*) Using Microsatellites- Bobcats (*Lynx rufus*) are generalist carnivores with an expansive range from southern Canada to northern Mexico. The bobcat is wide ranging, solitary, and territorial. Bobcat habitat in PA and NJ has become increasingly fragmented due to urbanization and development of agricultural land. There is little information on the genetic structure of bobcat populations in NJ and PA. To address this question, microsatellite DNA (Lc106, lc109, Lc110, Fca8, Fca43, and Fca90) data was used to determine relatedness between individuals (PA=34, NJ=43). The resulting kinship data will be compared to spatial organization of the bobcats from NJ and PA. The number of alleles at each locus ranged from three and seven. Measures of genetic diversity that will be analyzed are observed and expected heterozygosity, allelic frequency, polymorphic information content (PIC), and probability of identity (PI). On a regional scale, microsatellite data can reveal distinct genetic groups within the bobcat populations. Genetically defined groups are potential conservation units and should be used for regional management of bobcats. (182)*

**Fuesler, John\*** and **Jane F Cavender**, Biology Department, Elizabethtown College, Elizabethtown, PA 17022. *SV40 large T antigen interaction with TATA-binding protein is abrogated by W94A or F98A amino acid substitutions within the pAb 416 epitope* – SV40 large T antigen (Tag), a viral oncoprotein is sufficient to cause oncogenic transformation of mammalian cells in culture and form tumors in experimental animal models. The promiscuous transcriptional activity of Tag is proposed to aid the increased demand for protein expression in rapidly-dividing transformed cells. Tag interacts with TATA-binding protein (TBP) to transactivate genes containing RNA Pol I, II and III-dependent promoters; and this interaction has been demonstrated previously in *in vitro* GST fusion protein studies. We have determined that exogenously expressed full length Tag and N-terminal fragments of Tag (aa 1-121, 1-127, 1-138 and 1-147) bind TBP in Saos-2 human osteosarcoma cells. Additionally, our lab has further mapped the PAb416 antibody epitope to include aa 94 and 98 of Tag; specifically, amino acid substitutions W94A or F98A prevented PAb416-Tag binding in immunoprecipitation and Western blotting studies. Preliminary co-immunoprecipitation data suggest amino acid substitutions W94A or F98A disrupt Tag-TBP interaction; additionally, Tag-TBP complexes can be co-immunoprecipitated with N-terminal PAb902 and C-terminal PAb901  $\square$ -Tag antibodies but not with PAb416 antibody. Taken together, these preliminary data suggest that TBP interacts with aa residues 94 and 98 of Tag and this wild-type PAb416 epitope is essential for Tag-TBP complex formation. (7)

**Fulton, Elizabeth L.\***, **Nancy A. Thorp**, **Michael D. Bilger**, and **Jack R. Holt**. Department of Biology, Susquehanna University, Selinsgrove, PA 17870. *Results of the relationships between members of the benthic community from discrete samples defined by water depth and discharge in lower Penns Creek (Snyder County, PA)*. - A section of Penns Creek in Selinsgrove, Pennsylvania was sampled to determine the influence of discharge on communities of macroinvertebrates, periphyton

and plants. Six transects placed thirty meters apart were set longitudinally along a segment of Penns Creek. Twelve sample sites were selected based on discharge: high, medium and low. This allowed for discrete samples of macroinvertebrates and periphyton communities in microhabitats as opposed to the generalized sampling methods specified by USEPA rapid bioassessment protocol for streams and wadeable rivers. At each sample site, a diatometer was deployed and three macroinvertebrate samples were collected using a Hess Sampler. Area coverage by plants at each site was estimated. Correlations will also be made between the occurrence of macroinvertebrate families and periphyton species and plant species. (95)

**Gardner, Ian\***, **Anna Jaworski**, **Adam Fehn**. Juniata College, Huntingdon, PA 16652. *Foliar Morphology of *Castanea dentata* Sub-populations in Pennsylvania*. This research was conducted to determine the present morphological status of American Chestnut (*Castanea dentata*) populations using leaves collected from five regions in Pennsylvania. We examined three questions - Is there evidence of hybridization with introduced chestnut species; are the sub-populations of *C. dentata* morphologically distinct; and have environmental stresses contributed to this variation? To look for evidence of hybridization, we compared trichome sizes and densities on leaves between sites. The presence of stellate hairs was also recorded. This was done using Scanning Electron Microscope at 100x and 300x magnification. We used two different tests to examine these morphological variations. First, we conducted a Fourier analysis to evaluate the outline of each leaf. Next, we used Procrustes rotation to compare four landmarks on each leaf. Finally, using leaf asymmetry measurements, we looked for evidence of environmental stress. The results of this study have several applications to benefit The American Chestnut Foundation's attempt to re-establish the tree in Eastern forests. Information on

leaf morphology can be used for comparison with the blight resistant back-crosses. The identification of stressed populations will facilitate recovery of existing populations and improvement of site conditions. (45)

**Gau, Yael\*, Nicole O'Brien\*, Jeff Myers, Alyssa Bumbaugh and Lucinda Elliott.** Shippensburg University, PA 17257. *The Role of Autophagy in Shigella flexneri Infections.* Autophagy is a cellular housekeeping process used at basal levels to recycle old organelles and long-lived cytosolic proteins, but is also induced during times of stress such as nutrient deprivation. Autophagy also functions as an alternative mechanism to target intracellular parasites for destruction. Recent evidence suggests that some intracellular pathogens, including *Shigella*, have evolved mechanisms to subvert autophagy for bacterial growth and survival. In this study, we infected two brain tumor cell lines with *Shigella flexneri*; one (SNB19) in which autophagy is blocked due to a mutation in a critical regulatory protein (Atg5) and one (SNB19/Atg5) in which autophagy is functional because a normal copy of Atg5 cDNA is expressed. To determine the effect of functional autophagy on pathogen survival, the infected cell lines were incubated under conditions that stimulate autophagy. Preliminary data indicate that SNB19/Atg5 take up more bacteria than SNB19, which suggests autophagy may facilitate the infection process. Killing assays are ongoing to determine the role of functional autophagy on survival of *Shigella* in infected cells. (161)

**Giaccio, Aimee\*, Derreck Shenk and Melinda Harrison.** Cabrini College, Radnor, PA 19087. *Wine Chemistry: Measuring the Effects of White Oak Tree Elevation in Ellagitannin Alcohol Absorption*—This experiment used American White Oak Trees to determine if different elevation levels can affect the absorption rate of ellagitannins from the wood into wine alcohol. Ellagitannin's help to provide wine with its distinct aroma and flavor. Ten tree samples were obtained at high and low elevations with the use of a coring device that drilled into the center of the trees to the core. The samples

were ground up with a Wiley Mini Mill containing a 40 mesh filter and incubated to dry out the ground core samples. The wood samples were then soaked in a solution of 63% ethanol to mimic that of wine alcohol. Three trials were run for each sample with time intervals of 1-5 minutes and 20 minutes. After each interval, samples were transferred to a cocktail that had a solution of 3% sodium bicarbonate, DI water and a Folin-Ciocalteu reagent. A colorimetric assay ensued and the cocktails containing the samples were incubated in a water bath for 20 minutes and then the absorbance was measured at 760 nm. The average absorbance of high elevation tree samples at 20 minutes was 0.057 and low at 0.055. It was determined that different elevation levels did not impact the alcohol absorption of ellagitannins in White American Oak Trees. (22)

**Gill, Hasreet K.\*, Olivia Helfer, Frederic J. Brenner and Durwood B. Ray.** Grove City College, Grove City, PA 16127. *Phylogenetic Analysis of the Brant Goose, Branta bernicla, on the Basis of Complete Mitochondrial D-loop Sequence Comparisons* – Phylogenetic insight may be derived from complete D-loop sequencing and subsequent comparison between closely related species. Here, the D-loop for the brant goose (*Branta bernicla*), was sequenced entirely for the first time and compared to existing D-loop sequences for the Canada goose (*Branta canadensis*) and the white-fronted goose (*Anser albifrons*). Overall homology, along with the abundance and locations of single nucleotide polymorphisms (SNPs), as well as more pronounced regional sequence differences are in accordance with the phylogenetic positions of these species relative to the brant goose. The lower degree of homology (95%) between the white-fronted goose and the brant D-loop sequences reflects both a more distant phylogenetic relationship than that between the Canada goose and the brant (99% homology), and a closer relationship than that between the Canada goose and the white-fronted goose (92% homology). The manipulation of specific and unique sequence variations between species on the basis of heritage

may allow for reconstruction of phylogenetic relationships, a more detailed description of D-loop function in corresponding eukaryotic processes, and more developed practical applications, such as identification. (183)

**Gipe, Kathy\***. Pennsylvania Natural Heritage Program and the Pennsylvania Fish and Boat Commission, Bellefonte, PA 16823. *The North American Amphibian Monitoring Program in Pennsylvania: gathering data and assessing long-term trends* — The mission of the North American Amphibian Monitoring Program (NAAMP) is to provide a statistically defensible program to monitor populations for trends at multiple geographic scales (state, region, physiographic region). NAAMP uses a calling survey technique where observers listen for anuran vocalizations along assigned random roadside routes. Initial protocols were developed by 1996, based upon previous amphibian calling survey work and the Breeding Bird Survey. The first analysis of trends was published in 2009 for six years of data (Weir et al. 2009). A grant has recently been awarded to USGS to update and continue this trend analysis. Pennsylvania has been a partner in NAAMP since 2001, but coverage of routes has been sporadic. Volunteers are still needed for many routes across the state in order to improve the data set for use at both a local and regional level. A route is conducted 3 times per year, during a specified sampling window. The Frog Call Quiz is a website ([www.pwrc.usgs.gov/frogquiz](http://www.pwrc.usgs.gov/frogquiz)) for learning or refreshing frog call identification skills. NAAMP observers are asked to annually take the frog call quiz and achieve a detection index of 65 or greater. (63)

**Glick, David L.<sup>1</sup>, Natalie Crawley<sup>1\*</sup>, Lisa Grant<sup>1\*</sup>, and Michael A. Sulzinski<sup>2</sup>.** <sup>1</sup>King's College, Wilkes-Barre, PA 18711. <sup>2</sup>University of Scranton, Scranton, PA, 18510. *Real-Time PCR assay for *Burkholderia gladioli*. - *Burkholderia gladioli* is a bacterium that can infect plants and humans. While several PCR based methods have been described to detect the DNA of this organism, none are appropriate for conversion to Real-Time*

PCR. We developed a primer pair that amplified a small fragment (149 bp) from the esterase C gene of *B. gladioli*. With this primer pair, we developed a sensitive and specific real-time PCR assay for *B. gladioli* (ATCC strain 10854). Under optimized conditions, with the MiniOpticon (BioRad), the method is able to detect 3800 femtograms of *B. gladioli* (ATCC strain 10854) DNA, which is approximately 540 *B. gladioli* equivalents. The primers gave negative results with two ATCC strains of *B. cepacea* and two ATCC strains of *Pseudomonas aeruginosa*. The primers were able to positively identify four strains of *B. gladioli* isolated from infected onions and four strains from *B. gladioli* isolated from patients. We are currently determining the sensitivity of the Real-Time PCR assay for these additional strains of *B. gladioli*. (177)

**Gordon, Matthew<sup>1\*</sup>, Kenneth Anderson<sup>2</sup>, and Andrew Turner<sup>1</sup>.** <sup>1</sup>Clarion University, Clarion, PA 16214; <sup>2</sup>Pennsylvania Fish and Boat Commission, Tionesta, Pennsylvania. *Brook Trout spawning success in response to three alkalinity addition treatments in the Kinzua Creek watershed* - This study evaluated the relative effectiveness of three alkalinity addition methodologies in improving brook trout spawning success in acid-rain degraded headwater streams. Three headwater streams were experimentally manipulated with the addition of alkaline material to the watershed, with each stream treated in a different manner, and two streams remained as unmanipulated controls. The three treatment methodologies consisted of 1) covering streamside service roads with limestone driving surface aggregate (DSA), 2) DSA addition plus the construction of a roadside treatment system consisting of a drain filled with finely crushed limestone, and 3) DSA addition plus the construction of a roadside treatment system consisting of a drain filled with crab shell chitin. Stream chemistry, measured before and after construction of treatment systems, showed improved water quality in the two treatments with roadside alkalinity addition systems compared to the two control streams, with best results from the treatment system containing crab shell chitin. Evaluation of spawning

success was determined through redd (brook trout nest) counts conducted in the fall, and summer electrofishing counts of young-of-year brook trout before and after treatment. Preliminary results indicate increased brook trout spawning success in treatment streams, with additional field work planned for summer 2011. (84)

**Grebski, Wes\***. The Pennsylvania State University, Hazleton, PA 18202. *Optimization of the Solar Thermal Heating System for Residential Use* - The presentation describes different concepts of solar thermal supplementary heating systems. Different solar thermal heating systems are being discussed from the perspective of their cost, productivity, and required surface area. The productivity and efficiency of the systems are being analyzed for a Northeastern Pennsylvania geographic location. The analysis is being done for different sun exposures. An attempt was made to do the optimization of the solar thermal heating system. The shortest return on the investment was the main optimization criteria. Conclusions and recommendations will also be presented. (106)

**Gring, Jeffrey P.\* and Douglas S. Glazier**. Juniata College, Huntingdon, PA 17050. *The effects of temperature and body size on the metabolic rate of the freshwater amphipod Gammarus minus, a comparison of two models.* - Metabolic rate is affected mainly by an organism's body size and temperature. The Metabolic Theory of Ecology (MTE) proposes that these factors interact in an independent and multiplicative fashion. The MTE predicts that temperature should affect the elevation of the scaling relationship between metabolic rate and body mass, but not the scaling exponent (slope in a log-log plot), which should stay near 3/4. However, the Metabolic-Level Boundaries (MLB) hypothesis predicts that increasing temperature should not only increase the elevation of the metabolic scaling relationship, but also decrease its scaling exponent ( $b$ ). We tested these two alternative models by examining the effects of temperature on the body-mass scaling of resting metabolic rate in the amphipod *Gammarus minus*

from three thermally stable springs in Huntingdon County, Pennsylvania. We found that  $b$  varied significantly among three different test temperatures (4, 10 and 16° C) for amphipods from two cold (10° C) springs (Petersburg:  $b = 0.44, 0.68$  and  $0.92$ ; Blue:  $b = 0.91, 0.44$  and  $0.61$ ), but not for those from a warm (16° C) spring (Warm:  $b = 0.59, 0.67$  and  $0.52$  at 10, 16 and 22° C). Our data did not consistently support either the MTE or the MLB hypothesis. (92)

**Grisè, Sara N.<sup>1,2\*</sup> and Theo Light<sup>1</sup>**. <sup>1</sup>Shippensburg University, Shippensburg, PA; <sup>2</sup>Pennsylvania Sea Grant. *A framework for evaluating risk of aquatic invasive species range expansions in a changing climate in Pennsylvania* - A significant portion of environmental change has been driven by two major stressors: climate change and species invasions. In combination, these stressors are a challenge to scientists attempting to predict their future synergistic impacts. This study explores the vulnerability of Pennsylvania's aquatic ecosystems to the movement and introduction of invasive species responding to a changing climate. It addresses which species currently south of Pennsylvania have the greatest potential to expand their ranges northward based on the temperature predictions of three IPCC emission scenarios. The USGS Non-Indigenous Aquatic Species (NAS) database was used to identify over 50 potential fish, plant, and invertebrate NAS that could pose a future threat to Pennsylvania. Natural history information, meteorological data, and an online-climate matching program were used to determine which of these species had the greatest increase in suitable climate in Pennsylvania in 2099. Climate predicting software will then be used to generate maps, suitability indices, and other tools that will be combined into case studies for the most risky species. These case studies will supply a framework to be used on other species of interest, and will provide tools that can be used to develop proactive prevention strategies, and prioritize species of greatest risk to Pennsylvania. (3)

**Gross, Douglas A.\* Pennsylvania Game Commission, Endangered Bird Specialist,** Orangeville, PA 17859. *Pennsylvania Boreal Conifer Forests Bird Challenges and Opportunities.* – Pennsylvania spruce and hemlock-dominated forests, found primarily on glaciated parts of the Allegheny Plateau, are relicts of former conifer forest and boreal ecosystems. Most of these boreal conifer forests are peatlands at headwaters of high quality cold water streams. They are habitat islands, isolated from other boreal forests but nested within large forest blocks. The timber era (late 1800's - early 1900's) destroyed most of the PA spruce forests, but there has been partial recovery of boreal vegetation and bird communities through benign neglect. These forests support the most southerly extent of breeding Yellow-bellied Flycatcher, *Empidonax flaviventris*, and Blackpoll Warbler, *Dendroica striata* (both PA Endangered). Yellow-bellied Flycatcher is persistent at some locations despite rarity. These boreal conifer forests also host numerous other northern species, including high conservation priorities. Many representative species require specialized surveys for adequate monitoring. Vegetation structural diversity is an important factor of locations that support the rarest species and most diverse assemblages. The best boreal conifer sites are fairly well-protected but their isolation, additional threats, and general lack of appreciation and support present challenges for conservation. Climate change and energy extraction are added threats. Natural conifer regeneration at sites show management potential despite many obstacles. (34)

**Grundowski, Janel\* and Jeramia Ory.** King's College, Wilkes-Barre, PA 18711. *The Role of CNLAC1 and CNLAC2 in Azure B Reactive Activity in Cryptococcus neoformans - Cryptococcus neoformans* is an opportunistic, basidiomycetous yeast that usually grows in the soil. This yeast is usually harmless to humans, but with immunodepressed individuals it can be life threatening. *C. neoformans* enters the system by inhalation and can therefore cause an infection in the lungs of the individual. *C. neoformans* produces melanin via a copper

dependent laccase that is required for virulence. This laccase activity is controlled primarily by the CNLAC1 enzyme, which is expressed in response to environmental conditions and compounds. Frequently, basidiomycetous yeast that melanize also contain a lignolytic activity responsible for the breakdown and utilization of plant derived lignin, although this activity has not been directly observed in *C. neoformans*. We have recently observed that media harvested from *C. neoformans* reacts with Azure B, a spectroscopically tractable dye that serves as a lignin analogue. In order to test the hypothesis that CNLAC1 or its homolog CNLAC2 is responsible for Azure B reactivity, we have conducted kinetic characterization on media derived from four strains: CNLAC1/CNLAC2, *cnlac1*/CNLAC2, CNLAC1/*cnlac2*, and *cnlac1/cnlac2*. The *cnlac1*/CNLAC2 and *cnlac1/cnlac2* strain exhibit no Azure B reactivity, suggesting a soluble form of CNLAC1 may have both laccase and ligninase activity. (173)

**Gruzinski, Jamie\*, Keri Lynn, Joe Fiedor, Shannon Nix, and Suzanne Boyden.** Clarion University, Clarion, PA 16214. *Effects of flyash on soil processes and chemistry: Helpful or harmful?* - Flyash is a byproduct of coal burning that has potential uses as a compost amendment because its aluminum and silica content is thought to stabilize soil nutrients. Developing agricultural applications for flyash requires better understanding of its positive and negative effects on soil processes. We tested 8 flyash/compost mixtures (two composts with different ratios of hay:manure x four flyash concentrations). We evaluated decomposition rates of the mixtures in aerobic incubations and did chemical analyses of collected leachate. We also added the compost mixtures to soil pots and looked at effects on pH and nutrition over time. We found strong effects of flyash on soil chemistry. Flyash accelerated decomposition rates in carbon-rich composting materials, but slowed decomposition rates in nitrogen-rich compost, demonstrating that flyash effects on soil processes depend on physical and chemical qualities of the composting material. In general, metals concentrations in the leachate

were low early in the incubations, and remained low or declined over time. In contrast, nutrient levels in leachate were low initially and increased over 12 weeks, suggesting flyash may stabilize compost and slow the release of mobile nutrients to the groundwater, benefitting plant nutrition and growth. **(134)**

**Hager, Kayla\*** and **André P. Walther**. Cedar Crest College, Allentown, PA 18104. *Regulation of Protein-Protein Interactions by Phosphorylation of Replication Protein A in the Budding Yeast *Saccharomyces cerevisiae** – Replication Protein A (RPA) is a highly conserved, hetero-trimeric protein (encoded by *RFA1*, *RFA2*, and *RFA3* in yeast) that physically interacts with proteins involved in DNA repair, DNA recombination and DNA replication. Rfa2p is phosphorylated in response to DNA damage and this is thought to help regulate RPA's functions in the cell. To determine whether RPA phosphorylation regulates protein-protein interactions *in vivo*, we used Yeast Two Hybrid (Y2H) Analysis to identify proteins that interact with RPA in a phosphorylation dependent manner. This system uses the transcription factor Gal4p, composed of two functional modules, a Gal4p Activating Domain (GAL4AD) that activates RNA Polymerase II-dependent transcription, and a promoter-specific DNA binding Gal4p Binding Domain (GAL4BD). We developed Y2H expression vectors containing RPA subunits with mutations in known phosphorylation sites that were fused to the GAL4BD (RPA-GAL4BD). RPA-GAL4BD fusion proteins were transformed along with a random library of proteins fused to the GAL4AD into *Saccharomyces cerevisiae*. Physical interactions between GAL4BD and GAL4AD fusion proteins were identified by the expression of specific reporter genes. Using this method, we have identified a number of proteins that physically interact with RPA and are in the process of identifying phosphorylation dependent interactions. **(33)**

**Haklar, David\***, **John Kilmer**, **Mike Bilger**, and **Jack Holt**. Susquehanna University, Selinsgrove, PA 17870. *Benthic Macroinvertebrates of the Middle Susquehanna River Basin: Between Site Comparisons at the Byers Island Transect for the Years of 2009-2010*. - Benthic macroinvertebrates indicate much about an ecosystem and its drainage basin. In a second year of monitoring the upper main stem of the Susquehanna River, we placed rock baskets at the Byers Island transect near Hummels Wharf, Pa and others upstream near Shamokin Dam, Pa. Macroinvertebrate communities collected by the rock baskets were identified and compared to those collected in an identical study done in 2009. The rock baskets sampled from the fall in 2009 had a greater number of macroinvertebrates and contained many more different taxa, while the rock baskets sampled during the summer of 2010 had distinctly fewer individuals and fewer taxa within the baskets. Averages of 1,370 individuals were found per site in 2009, but in 2010 only 783 individuals were found on average for each site. The differences in seasons, water flow, and drift influenced the changes seen throughout the 2009 and 2010 samples. **(96)**

**Harle, Kimberly K.\***, and **Jane E. Huffman**. East Stroudsburg University, East Stroudsburg, PA 18301. *Wild Canids as Sentinels of Infectious Disease* – Disease is difficult to detect and measure in free-ranging wild animals. The objective of this study was to document whether or not disease is present, and if so, the prevalence in wild canids in Pennsylvania. During a two year study from 2009-2011, spleens, hearts and intestinal tracts of 171 coyotes (*Canis latrans*) and 246 red foxes (*Vulpes vulpes*) as well as spleens and hearts from 21 gray foxes (*Urocyon cinereoargenteus*) were collected from hunters and trappers and examined for parasites and infectious agents. Sarcoptic mange (*Sarcoptes scabiei*) and helminths were found at low prevalences. Heartworm (*Dirofilaria immitis*) was not present. The occurrence of babesiosis, Lyme disease, Rocky Mountain spotted fever, anaplasmosis and ehrlichiosis were evaluated in splenic tissue from 122 coyotes, 196 red foxes, and

11 gray foxes in Pennsylvania. DNA was extracted and analyzed by polymerase chain reaction (PCR) using disease specific primers. Products were visualized by gel electrophoresis. There were no positive cases of Lyme disease or Rocky Mountain spotted fever. *Babesia* spp. prevalence rates were 3.3% (4/122) for coyotes and 0.5% (1/196) for red foxes. Testing and analyses for anaplasmosis and ehrlichiosis is ongoing. Future investigation of *Babesia* spp. isolates will include sequencing to confirm identification. (72)

**Harlin, Heather M.\*, Marissa L. Marietti, and Dr. Audrey J. Ettinger.** Department of Biological Sciences; Cedar Crest College; Allentown, PA 18104. *Testing Ginkgo biloba as a Treatment for Apoptosis in a Chick Primary Neuron Model* -- During neural development, extra neurons are eliminated through an active process known as programmed cell death, or apoptosis. Neurons *in vivo* or *in vitro* can be induced to undergo apoptosis by treating them with glutamate, an amino acid neurotransmitter. Many diseases of the nervous system include neural death as a common pathology, which is particularly problematic as mature neurons generally do not divide. In the common disorder stroke, an initial phase of necrotic cell death is followed by a longer period of apoptosis, which can dramatically increase the area of brain damage. While there are some treatments available to reduce the initial damage of a stroke, there are currently no options for blocking apoptosis clinically using drugs. Herbal medicines, including *Ginkgo biloba*, have been an active area of inquiry as a potential treatment for apoptosis. Here, we have used glutamate-induced apoptosis in primary chicken neuronal cultures as a model system. Apoptosis timing was studied using cell staining and Western blot approaches to examine the expression of apoptotic factors. The timeline of apoptosis will then be used to determine the effectiveness of *Ginkgo biloba* in reducing the severity of damage following glutamate treatment through cell survival assays and microarray analysis. (164)

**Hart, James A.\* Wildlife specialists, LLC.** Wellsboro, PA and **Dr. Howard Whidden** East Stroudsburg University. *2010: A Mammal Odyssey or "Where do we go from here?"*- Pennsylvania has a long and storied history concerning the study of mammalogy. From Spencer Baird, during his tenure at Dickenson College, to the establishment of the Pennsylvania Game Commission as the first state agency in the nation devoted to the conservation of mammals, the evolution of mammal research and conservation has continued to provide leadership for mammal conservation within the northeast US and beyond. This paper will trace the history of mammalogy in Pennsylvania as well as discuss various accomplishments and prominent mammalogists such as Charles Mohr, John Hall, Gordy Kirkland and many others. It will also address the creation of organizations such as the PABS, Mammal Technical Committee and the PA Heritage Program, all tasked with overseeing species statuses as well as tracking the state's mammal fauna. The rise of a variety of possible threats to the persistence of mammals and mammal habitats such as WNS, energy needs and habitat loss and fragmentation, and changes in societal understanding of mammalogy, has somewhat clouded the future for the study of mammalogy in the Pennsylvania. (66)

**Hart, James A.\*, J. M. Benner, and C. Voorhees.** Wildlife Specialists, LLC. Wellsboro, PA 16901. *Results of a large scale mist-netting survey of the Pine Creek Gorge area, Tioga and Potter Counties, Pennsylvania* - During the summer of 2010, a large-scale mist-netting survey was conducted along the west rim of the Pine Creek Gorge, located in northcentral Pennsylvania. One hundred thirty sites were mist-netted using the USFWS Standard Indiana Bat Protocol. The habitat ranged from deciduous forest along ridgetops, small valleys and stream corridors to edge habitat along agricultural fields or other openlands. A total of 1,835 bats of 7 species were captured including 790 *Myotis septentrionalis*, 648 *M. lucifugus*, 166 *Eptesicus fuscus*, 122 *Lasiurus borealis*, 56 *L. cinereus*, 45 *Lasionycteris noctivagans* and 2 *M. leibii*. The

totals for both *Lasiurus cinereus* and *Lasionycteris noctivagans* are presently thought to be the historically largest single season capture numbers for these two species in Pennsylvania and may indicate a resident population of silver-haired bats within the Pine Creek Gorge area. In light of ongoing declines in bat populations due to WNS, this project should provide a good baseline comparison for future reference should someone undertake to duplicate this particular study. (67)

**Hartzler, Christopher\*, James R. Hartzler, and Bradley G. Rehnberg.** York College of Pennsylvania, York, PA 17403. *An Analysis of the Benthic Insect Community in McMichael's Creek, PA Under Open and Closed Tree Canopies* - The abundance and diversity of aquatic insects as influenced by tree cover was determined for McMichael's Creek, PA in the summer of 2010. In order to evaluate differences in insect abundance between an open and closed tree canopy, wire baskets containing rock substrates were created and placed in the stream and were allowed to be colonized for 3, 6, or 9 weeks. With 18 substrate baskets at both open-canopy and closed-canopy sites, 6 baskets were randomly removed at each of the three time periods. Insects were washed from baskets and then preserved. Sorting and identification of insects down to family was done on all 36 samples. In the majority of samples, those from the open canopy had a higher total number of insects. Of the major orders that colonized the baskets, Trichoptera and Ephemeroptera were the most abundant followed by Diptera and Plecoptera. (94)

**Helfrick, Alicia\* and Theo Light.** Shippensburg University, Shippensburg, PA 17257. *Diet and behavior of Appalachian brook crayfish in acidic and pH remediated mountain streams* - The Appalachian brook crayfish (*Cambarus bartonii*) is abundant in most higher-elevation streams in south-central Pennsylvania, including many affected by acid precipitation. These acidified streams (pH < 5.0) typically do not support fish, though brook trout are present in downstream, less acidic, reaches. We hypothesized that the absence of trout

might lead to changes in crayfish diets, due to reduced competition and predation. We tested this hypothesis in two upper elevation streams, Laurel Run (Perry County) and Mountain Creek (Adams and Cumberland Counties), both of which have upstream acidic reaches and downstream reaches with increased pH due to remediation with limestone sand. Stable isotope analyses of *C. bartonii* muscle tissue, as well as gut content analyses, indicated significant differences in the diets of crayfish upstream and downstream from the remediation sites. We are currently preparing additional likely crayfish food sources (benthic invertebrates, algae, moss, and detritus) for analysis. We will compare these isotopic results with those for crayfish tissue in hopes of estimating the approximate contribution of each food source to crayfish diets. We expect to see a higher contribution of animal food to the diets of crayfish from the upstream reaches, and more primary producers and detritus in the diets of those downstream. (85)

**Hoffman, Michael J.\*, and Thomas C. LaDuke.** East Stroudsburg University, East Stroudsburg, PA 18301. *Habitat preferences of neotropical pitvipers in Costa Rica.* We conducted a preliminary investigation for an ongoing study of habitat utilization of two neotropical pitvipers (Crotalinae): the tropical hognose pitviper (*Porthidium nasutum*) and the terciopelo (*Bothrops asper*). After quantifying habitat variables from individuals found in the field, we used descriptive statistics to examine the relationship between the snakes and the available macrohabitats, and to assess the degree of potential competition and divergent foraging behaviors between them. Based on the small sample sizes available after a single field season, we found that *P. nasutum* is typically found in closed-canopy forests, foraging in the open by ambush while *B. asper*, which may overlap with *P. nasutum*, utilizes a variety of habitats and displays different foraging behaviors. The diversity in habitat utilization and foraging behaviors characteristic of *B. asper* may be due to increased diversity of prey which may become exploitable as the snake grows. More data

from an upcoming field season should enable the investigators to closely examine the role of habitat preference in reducing potential competition between comparably-sized individuals of the two species in question. (43)

**Hollander, Jeffrey\*** and **Megan Rothenberger**. Lafayette College, Easton, PA 18042. *Distribution, Decomposition Rate, and Phosphorus Content of Two Exotic Plant Species* – Although invasive species are of national and global concern, the impact of invasive wetland plants on organic matter accumulation, soil nutrient transformations, and changes in surface water chemistry remain largely unknown. Litter bag methods were used to quantify and compare decomposition rate and phosphorus concentrations of above- and below-ground tissue among two invasive species (i.e., *Lythrum salicaria* and *Anthriscus sylvestris*) and one native plant (i.e., *Typha latifolia*) in three wetlands. Geographic Information Systems (GIS) was used to map the current distribution of *L. salicaria* and *A. sylvestris* within Jacobsburg State Park where these plants are displacing native biota. This initial mapping effort will be used as a baseline for assessing whether the nature and extent of *L. salicaria* and *A. sylvestris* distributions are changing within the park. Results indicate that over-wintered *L. salicaria* and *A. sylvestris* stems are most resistant to decomposition, decreasing the amount of growing space available to native plants such as *T. latifolia*. Belowground *L. salicaria* and *A. sylvestris* had phosphorus concentrations 2.5 and 5 times higher, respectively, than *T. latifolia*. These preliminary results indicate that conversion of vegetation from cattails to these invasive species may result in changes in wetland function. (49)

**Huffman, Jane, and Karalynn Kruger\***. East Stroudsburg University, East Stroudsburg, PA 18301. *Determining canine breed type based on fur analysis* – The forensic examination of animal hair is a well established discipline and has been so for over a century. The basis of all animal hair examination is microscopy, which may enable the hair analyst to identify a hair as animal in origin,

characterize the hair to a particular family or species and to conduct comparative examinations. There are 167 different breeds currently recognized by the American Kennel Club with new breeds added annually. Canine hairs bear microscopic features or characteristics that may assist in their identification. Fur was collected from 85 breeds. The fur was examined microscopically to evaluate the most reliable quantitative parameters that can be used to differentiate the breeds. The features examined included the scale pattern present along the shaft and the medulla. Different indices were calculated including maximum diameter of the shaft, medullary diameter, and the medullary index. (73)

**Jaeger, Wendy\*** and **Dr. Ahmed Lachhab**. Susquehanna University, Selinsgrove, PA 17870. *Mahanoy Creek Acid Mine Drainage: An Effort to Assess Water Quality*- This study examined the effects of acid mine drainage on creek water quality in the Mahanoy Creek Drainage Basin in Eastern Pennsylvania. The study site was located in Northumberland County, PA in a rural setting bordering state game lands. Results were compared to standards set by the Commonwealth of Pennsylvania for warm-water fisheries. Concentrations of ferrous iron, sulfate, aluminum, and magnesium were measured in two intervals. The first interval lasted for ten days in the April of 2010; the second interval lasted for seven weeks in June and July of 2010. During the summer study, pH, dissolved oxygen, and contaminant levels were monitored. Sulfate levels were high during both seasons (280mg/L to 450mg/L), with levels steadily increasing in the spring and fluctuating in the summer. These levels violated Pennsylvania water standards (250 mg/L). Dissolved iron levels were twenty times greater (6.1 mg/L) than the standard for warm water and cold water fisheries (0.3mg/L) during one week in June 2010. The spike in iron concentration correlated to a spike in pH levels for that week. (102)

**Johnson, Nels, Tamara Gagnolet\*, Rachel Ralls, Scott Bearer,** The Nature Conservancy, Harrisburg, PA 17110; **Ephraim Zimmerman, Brad Eichelberger, Chris Tracey,** Western Pennsylvania Conservancy, Pennsylvania Natural Heritage Program, Pittsburgh, Pennsylvania 15222; **Ginny Kreitler, Stephanie Orndorff, Sarah Sargent, Jim Tomlinson,** Audubon Pennsylvania, Harrisburg, PA 17110. *Forest Habitat Impacts and Conservation Opportunities in Marcellus Gas Development Areas.* Natural gas development has rapidly emerged as one of the biggest conservation challenges in Pennsylvania and other states with Marcellus Shale deposits. The Nature Conservancy and partner organizations assessed the potential forest habitat impacts of current and future Marcellus Shale natural gas drilling in Pennsylvania ([www.nature.org/paenergy](http://www.nature.org/paenergy)). We used maximum entropy modeling to produce a surface representing the probability of conversion to Marcellus gas development and then generated and mapped low, medium, and high scenarios for future Marcellus drilling. By 2030, sixty thousand new Marcellus gas wells could be drilled in Pennsylvania alone, directly clearing between 38,000 to 90,000 acres of forest and creating between 91,000 and 220,000 acres of additional forest edge habitats where the risk of predation, changes in light and humidity, and expanded presence of invasive species could threaten forest interior species. This development could transform the region's iconic forests and impact many thousands of acres of key habitat for songbirds, salamanders, and trout. The Nature Conservancy is partnering with conservation groups, energy companies, and research/training organizations to design and implement new tools for integrating conservation measures into Marcellus gas development plans in priority conservation landscapes, an effort we believe will significantly reduce impacts to interior forests. (50)

**Kandefer, Rachel\*** and **Michael A. Elnitsky,** Department of Biology, Mercyhurst College, Erie, PA 16546 USA. *The acquisition of freeze tolerance in the goldenrod gall fly, *Eurosta solidaginis*: environmental triggers and physiological cor-*

*relates* – Larvae of the goldenrod gall fly (*Eurosta solidaginis*) have long served as model organisms for studying the strategies used by freeze-tolerant animals for winter survival. The larvae of this insect undergo a marked transition from freeze intolerant during summer and early fall to freeze tolerant during late fall and winter. The acquisition of freeze tolerance permits survival at temperatures below -40 °C for extended periods; such tolerance represents one of the most cold-hardy animals on earth. The purpose of this study was to determine how seasonal changes in environmental conditions induce the larval acquisition of freeze tolerance and investigate the physiological alterations that occur to permit prolonged survival at subfreezing temperatures. Goldenrod galls were collected on a weekly basis, and the larvae extracted to monitor changes in supercooling point, freeze tolerance, hemolymph osmolality and ion concentrations, and body water content. In addition to declining ambient temperature, gall water content declined throughout autumn, with a marked drop in mid-October (in both 2009 and 2010) corresponding to plant senescence. This time period was correlated with increased larval freeze tolerance, hemolymph osmolality, and supercooling point. These results provide further understanding of the environmental triggers for the acquisition of freeze tolerance in *E. solidaginis* larvae. (124)

**Karnas, K. Joy\* and Audrey J. Ettinger\*.** Cedar Crest College, Allentown, PA 18104. *Showcasing Your Work: The Value of Science Education Presentations by Science Faculty* – Faculty at primarily undergraduate institutions spend the majority of their time in and around the classroom. When they are not actively delivering their material, they are designing novel methods for engaging students in the learning process. This is particularly true in the laboratory, where faculty constantly revise their lab activities to better convey subject material and incorporate new protocols to keep their students abreast of current technologies. In this presentation, two biologists from a small, liberal arts college discuss their novel pedagogical method that transcends course boundaries to bring together

two separate laboratory courses (Developmental Biology and Molecular Genetics II) with the goal of increasing student knowledge while engaging students in an authentic, original research project that generates useful data. They also discuss their experiences in presenting this material at national and international meetings. (52)

**Kauffman, James C.\*, Kimberly K. Harle, Matthew J. Swallow, and Jane E. Huffman.** North-east Wildlife DNA Laboratory, 314 Independence Highway, Suite 114. East Stroudsburg University of Pennsylvania, East Stroudsburg, PA18301. *Occurrence of the Giant Kidney Worm (*Diectophyma renale*) in Long-Tailed Weasels (*Mustela frenata*) from Pennsylvania.* Three adult giant kidney worms (*Diectophyma renale*) were found in the right kidneys of two male long-tailed weasels (*Mustela frenata*) from Pike County, Pennsylvania. At necropsy, both weasels showed no clinical signs of decreased fitness. The right kidneys of both animals were enlarged and contained nematodes. This is the first reported infection of long-tailed weasels by giant kidney worms. A more thorough investigation of long-tailed weasels across their range is recommended to determine prevalence rates of this parasite and potential impacts on weasel populations. (113)

**Keating, Michael P.\*, and Jeffrey A. Simmons.** Mount St. Mary's University, Emmitsburg, MD 21727. *Carbon and Nutrient Dynamics of *Justicia americana* in Stream Ecosystems* – We conducted a study on the carbon (C) and phosphorus (P) dynamics of the invasive macrophyte *Justicia americana* (water willow) in the Monocacy River, MD. This emergent plant species is rapidly proliferating in the shallow stream beds of many Maryland rivers. We harvested aboveground biomass at three locations for determination of total aboveground C and P. To evaluate the influence of root uptake on nutrient concentrations, we collected pore water samples within patches of *Justicia* and compared their P concentrations with those collected in unvegetated areas of the stream. Finally, leaf litter bags containing leaves of either

*Justicia* or a terrestrial tree species were deployed to determine decomposition rates. *Justicia* was a major contributor of autochthonous C (16 – 196 g m<sup>-2</sup>) in the sampled reaches. Decomposition of *Justicia* leaves were 1.7 and 2.2 times faster than leaves of *Ailanthus* and sugar maple leaves. The pore water analysis showed mean dissolved reactive P concentrations were 50.3% lower beneath *Justicia* patches compared to unvegetated patches suggesting uptake by *Justicia* roots. Thus, *Justicia* was found to be a major biomass and dissolved organic carbon contributor to the Monocacy River and it played an active role in P cycling. (79)

**Kelliher, Christina\* and Steven James.** Department of Biology, Gettysburg College, Gettysburg, PA 17325. *Functional analysis of conserved SSPP and SSPT motifs in the *snoA* mediator of meiotic recombination* – To begin meiosis in the budding yeast *Saccharomyces cerevisiae*, the conserved Dbf4-dependent kinase (DDK) induces double strand breaks (DSBs) that are necessary for meiotic recombination, by phosphorylating multiple SSPP and SSPT motifs in a yeast-specific meiotic regulator. In the filamentous fungus *Aspergillus nidulans*, *nimO*<sup>Dbf4</sup> constitutes the regulatory subunit of DDK. *Dbf4* orthologs, including *nimO*<sup>Dbf4</sup>, contain a checkpoint domain, the BRDF, which is known to mediate DNA damage responses. A *nimO*<sup>Dbf4</sup> mutant lacking this domain becomes sensitive to genotoxic agents that induce DSBs and furthermore suffers an early arrest in meiosis that causes sterility. We discovered mutations in a novel eukaryotic gene, *snoA* (*s*uppressor-of-*n*im*O*), that relieve the DNA damage sensitivity and restore normal fertility to *nimO*ΔBRDF mutants. Moreover, we discovered that the BRDF motif physically interacts with a region of *snoA* harboring three conserved SSPP or SSPT motifs, which thus may be targets for phosphorylation by DDK during meiosis. I have created *snoA* alleles substituting non-phosphorylatable alanine (AAPP/T) and phospho-mimic aspartate (DDPP/T) motifs. These

*snoA* mutants rescue the DNA damage defects of *nimO<sup>Dbt4</sup>* mutants. Experiments are underway to assess the role of these three motifs in meiotic recombination, and on physical association with the wildtype *nimOBRDF* domain. (148)

**Khalifeh, Mariam\*, Brad E. Engle, and Deborah S. Austin.** Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201. *The Effects of Water-Soluble Fiber Combined with Poly- and Monounsaturated Fatty acids on Plasma Lipoprotein Levels in Hypercholesterolemic Rats* - Hypercholesterolemia is a metabolic disorder characterized by elevated concentrations of circulating plasma low density lipoproteins (LDL). Hypercholesterolemia is directly associated with an increased risk for coronary heart disease. Pharmacological treatments for hypercholesterolemia result in adverse side effects and have been associated with potential carcinogenicity. Recent research has suggested that natural approaches and nonpharmacologic interventions, consisting largely of dietary modifications, are advocated as a first-line treatment for hypercholesterolemia. Olive oil, fish oil, and rice bran oil are rich in monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA), which affect plasma cholesterol metabolism via different mechanisms. Furthermore, oat bran, an important source of water-soluble fiber, is recognized as a potential hypocholesterolemic dietary component. This study investigated the efficacy of three diets, combining each of the unsaturated oils with oat bran, in lowering plasma cholesterol levels in hypercholesterolemic rats. In order to determine the effectiveness of each diet, plasma samples were collected from the rats, and quantitative analysis of plasma lipoproteins was performed using high performance gel filtration chromatography (HPGC). The results of this study will provide insights about how PUFAs, MUFAs, and water-soluble fiber may be used in combination diets to reduce plasma cholesterol concentrations in hypercholesterolemic patients. (25)

**King, Tabitha\*, and André P. Walther.** Cedar Crest College, Allentown, PA 18104. *Examination of a Potential Protein-Protein Interaction between Replication Protein A and PIF1 in the Budding Yeast *Saccharomyces cerevisiae** - Replication Protein A (RPA) is a single-stranded DNA binding protein composed of three subunits (RFA1, RFA2, and RFA3) that is involved in DNA replication, repair, recombination, and in maintenance of telomere length. Telomere length is important for cancerous cells because telomerase reactivation is required for cancerous tumors to grow. Our lab has shown that yeast cells expressing constitutively phosphorylated RFA2 have telomeric DNA that becomes very short, and when RFA2 is constitutively unphosphorylated, telomeres become very long. The DNA helicase PIF1 also regulates telomere length. Over-expression of PIF1 leads to short telomeres, while absence of PIF1 causes telomeres to become long. This indicates that PIF1 is a negative regulator of telomere synthesis. Our lab has preliminary evidence that PIF1 physically interacts with RPA. This is consistent with RPA's ability to stimulate the activity of other DNA helicases in the cell. Both proteins are found in the eukaryotic model organism *Saccharomyces cerevisiae*. *S. cerevisiae* is an ideal organism to study PIF1 and RPA because yeast telomeric proteins have high levels of structural and functional homology to human proteins. This study utilizes the Yeast Cross and Capture System followed by SDS-PAGE and Western analysis to examine the interaction between RPA and PIF1. (153)

**Kirschman, Lucas J.\*, Seth W. Kerr, and Kurt J. Regester,** Clarion University, Clarion, PA 16214, and **Eric J. Chapman,** Western Pennsylvania Conservancy, Blairsville, PA 15717. *Prevalence of an Emerging Fungal Pathogen (*Batrachochytrium dendrobatidis*) among Eastern Hellbender (*Cryptobranchus a. alleganiensis*) Populations in the Allegheny River Watershed, Pennsylvania* - Chytridiomycosis is an emerging infectious disease of amphibians associated with the fungal pathogen *Batrachochytrium dendrobatidis* (*Bd*). On a global scale, chytridiomycosis has been implicated in cat-

astrophic population declines and several species extinctions. In Pennsylvania, infected populations of the Eastern Hellbender salamander (*Cryptobranchus alleganiensis*) have been detected in streams of the Allegheny River watershed. Our objectives were to compare *Bd* prevalence (% of infected individuals) among hellbender populations and test for relationships between *Bd* prevalence and several measures of stream water quality. From June to October 2010, we hand captured 119 hellbenders in French, Tionesta, Little Mahoning, and Tubmill Creeks, collected skin swabs for disease testing, and quantified six water quality parameters at all sites. The fungal pathogen was detected at all sites and prevalence estimates for populations ranged from 7% to 21%. Low prevalence estimates were associated with streams with higher average pH and lower average dissolved oxygen content. Our study provides the first estimates of *Bd* prevalence for the Eastern Hellbender and indicates that infection levels for this species are relatively high compared to other salamanders. Identifying additional environmental conditions associated with chytridiomycosis is important for identifying populations at risk and modifying management plans. (87)

**Kish, Alexander\***, **Erin McClelland** and **Jeramia Ory**. King's College, Wilkes-Barre, PA 18711 and The Commonwealth Medical College, Scranton, PA 18503. *Microarray Analysis of Clinical Isolates of Cryptococcus neoformans - Cryptococcus neoformans* is an opportunistic fungal pathogen that is found in soil around the world. It primarily infects immunocompromised individuals, usually HIV or AIDS patients or individuals receiving immune suppressing drugs. Microarray analysis of 12 strains of *C. neoformans* isolated from AIDS patients in Botswana was carried out to examine whole genome expression in order to correlate patient outcomes with gene expression. Genes that were significantly regulated in regards to host mortality rate, host gender, and host white blood cell count in the cerebral spinal fluid were examined using Significance Analysis of Microarray (SAM) and cluster analysis. The strains that did not cause patients

to succumb to cryptococcosis in the hospital were shown to have significantly lower levels of expression of the gene CNAG\_03786. CNAG\_03786 encodes for a lysophospholipase activity, which has previously been shown to influence virulence as shown by previous microarray analysis. These strains could have had a harder time disseminating throughout the host CNS, resulting in a less severe infection and ultimately survival of the host. Analysis of other genes correlated with patient data as well as Gene Ontology and biochemical pathway analysis will also be presented. (165)

**Kissman, Amber\*** and **Michael A. Elnitsky**. Department of Biology, Mercyhurst College, Erie, PA 16546 USA. *Cold tolerance of the brown marmorated stink bug, Halyomorpha halys: implications for future range expansion* – For ectotherms such as insects, low temperatures are recognized as one of the most important factors limiting a species' range distribution. The brown marmorated stink bug (BMSB), *Halyomorpha halys*, is an agricultural pest insect thought to have been accidentally introduced from Asia into eastern Pennsylvania in the late-1990s. This species has since spread to several other mid-Atlantic states and has been moving north and west throughout Pennsylvania. Currently, attempts are being made to predict future range expansion of BMSB, however, few studies have yet addressed the biology of the insects, and essential no information is known regarding the temperature tolerance and overwintering physiology of BMSB. Therefore, we investigated the low temperature tolerance and strategy of overwintering survival of BMSB in an attempt to aid predictions of future range expansion (based upon thermal tolerance). No insects survived freezing, suggesting the BMSB must rely upon supercooling (i.e., remaining unfrozen at subfreezing temperatures) for winter survival. Additionally, even after cold acclimation the BSMB displayed only a modest depression of the temperature of crystallization (range from approx. -9 to -16°C). Therefore, winter survival within the northeastern U.S. is likely dependent upon the selection of protected over-wintering hibernacula buffered from extremes of temperature. (123)

**Klein, Sarah\*, Sakina Khaku, and André P. Walther.** Cedar Crest College, Allentown, PA 18104. *Replication Protein A Phosphorylation Regulates Cell Cycle DNA Damage Checkpoints in Saccharomyces cerevisiae* – Cell cycle checkpoints arrest cell cycle progression in the presence of DNA damage to let DNA repair pathways function. Once the damage is repaired, the checkpoint is turned off and the cell cycle resumes. If damage is unrepairable, the cell eventually overrides the checkpoint and the cell cycle resumes in the presence of damaged DNA through a process called adaptation. The single-stranded DNA binding protein Replication Protein A (RPA) is phosphorylated in response to DNA damage and has been implicated in checkpoint activation. To investigate the effects of RPA phosphorylation on adaptation, phosphorylated amino acids of RPA were mutated to alanines (*RPA-ala*) to imitate constitutively unphosphorylated RPA, or aspartic acids (*RPA-asp*) to imitate constitutively phosphorylated RPA. Unrepairable DNA damage was induced to activate the G2/M checkpoint, and progression through the cell cycle was monitored for 24 hours. The *RPA-asp* strain adapted normally, while the *RPA-ala* strain showed a defect in adaptation. Mutant forms of *KU70* and *RAD52*, proteins that are important in double-strand break repair, fail to adapt, but defects were suppressed by the *RPA-asp* mutation. *RPA-asp* did not suppress the defect in *Tid1*. Our results demonstrate that RPA phosphorylation plays a critical role in adaptation to the G2/M checkpoint. (31)

**Klemow, Kenneth, David Kirschtel, Kathleen Shea, Teresa Mourad.** Wilkes University, Wilkes-Barre, PA 18766; Education Consultant, Boston, MA; St. Olaf College, Northfield, Minnesota 55057; Ecological Society of America, Washington, DC 20036. *EcoEd Digital Library: Supporting innovative undergraduate ecology education through peer-reviewed collections* - EcoEd Digital Library is ESA's searchable online catalog of resources for teaching undergraduate ecology. Using EcoEd, faculty can find free teaching resources that are peer-reviewed for quality, scientific accuracy, and pedagogical use. Teaching resources include

photographs, figures, tables, datasets, articles, laboratory exercises, and simulation programs. Faculty who have developed their own visual resources (photographs, figures, tables) or student activities like lab, field and classroom exercises, are encouraged to submit them to the library for peer review and publication. In 2010, EcoEd DL switched to a new web platform to enhance community-building, including use of social media and user feedback of its resources. In 2011, ESA is partnering with Science Pipes and three other professional societies to develop tools to promote the use and analysis of large datasets in undergraduate classrooms. ESA's long-term goal for EcoEd is to build and maintain a library that is user-friendly and used by ecology researchers and educators to obtain current information and ideas for teaching resources. (109)

**Klomps, Lawrence V.\* and Christopher B. Goguen.** Science Program, Pennsylvania State University, Hazleton, PA 18202. *Nest-site characteristics of mountain plovers breeding on prairie dog colonies in northeastern New Mexico* – The mountain plover (*Charadrius montanus*) is a ground-nesting shorebird of the western Great Plains that is currently a candidate for federal listing as “Threatened”. This species commonly breeds in shortgrass prairie habitats, particularly in association with prairie dog (*Cynomys* spp.) colonies or large herbivores, such as American bison (*Bison bison*). Over two springs (2009 and 2010), we searched for plover nests on prairie dog colonies within an ~25,000 ha prairie pasture on Vermejo Park Ranch, northeastern New Mexico. Our objective was to document plover nest site characteristics for this poorly studied region. To locate nests we watched adults from a distance with binoculars. After nests had hatched or failed, we sampled vegetation at the nest site and at a non-use site 100 m away but within the same colony. Over both years we located 21 nests. Compared to non-use sites, nests were located on areas that were

more sloped, had greater bare ground but lower forb cover, shorter vegetation, and were farther away from the nearest prairie dog burrow. Aspects of plover nest site selection may relate to predator avoidance or reduction of risk of flooding. (119)

**Koons, Dustin\*, and Daniel Ressler.** Susquehanna University, Selinsgrove, PA 17870. *Determining Cloud Point, Specific Gravity, and Energy Content of a Homemade Biofuel.* - As fossil fuels are becoming increasingly more expensive to mine and refine, other fuel alternatives need to be considered to meet society's energy needs at low cost. Vegetable oil based biofuels have been considered to be a viable fuel choice since the birth of the ignition compression engine. Modern diesel engine technology demands high quality fuels with no debris or waxy formations that could clog the high-pressure fuel injectors. Used vegetable oil was filtered and mixed with kerosene and gasoline to determine if this blend had appropriate specific gravity, cold temperature characteristics, and energy density compared with petroleum-derived diesel fuel and traditionally processed biodiesel. The results show that homemade biofuels can be competitive to that of petroleum diesel fuel based on energy content and have an acceptable cold-temperature operating range for central Pennsylvania. From the results it appears that homemade biofuels can be an affordable and viable alternative fuel source with most of its ingredients being renewable which can be used in most diesel engine applications. (138)

**Kurt, Robert, Caroline Vail\*, and Jason Ewer\*.** Lafayette College, Easton, PA 18042. *Analysis of DAMP Expression in Mouse and Human Breast Cancer* - Damage associated molecular patterns (DAMPs) are secreted by injured cells and invoke an inflammatory response. DAMPs have been known to play an essential part in cell signaling leading to cancer. In this study Quantitative Polymerase Chain Reaction (QPCR) was used to screen 3 different mouse breast cancer cell lines (SM1, EMT6, and 168) against normal mouse mammary epithelial cells for DAMP expression levels. Elevated expression of heat shock protein 60 (HSP60)

and high-mobility group box 1 (HMGB1), both of which are intracellular proteins, were noted. In two out of three cell lines HSP60 was expressed at higher levels than HMGB1. Expressions of HSP60 was also found in 3 human breast cancer cell lines (MCF7, HBL100, and MDAMB231), although at levels lower than that found in normal mammary epithelial cells, and HMGB1 was markedly less expressed in human breast cancer cell lines compared to mouse breast cancer cell lines. Subsequent studies will aid in clarifying whether these proteins have a role in the rate of tumor growth. (12)

**Leone, Alyssa M.\*, Meghan A. Schlitt, and James R. Dearworth Jr.** Department of Biology and Neuroscience Program, Lafayette College, Easton, PA 18042. *Both Nicotinic and Muscarinic Cholinergic Receptors on the Ciliary Ganglion Mediate Pupil Constriction in Red-Eared Slider Turtles, *Trachemys scripta elegans** - Last year we reported that nicotinic cholinergic receptors on the ciliary ganglion mediate neural transmission to drive pupil constriction in red-eared slider turtles. We extended the study to compare the effects by vecuronium bromide, a nicotinic cholinergic antagonist, to those by atropine, a muscarinic cholinergic antagonist. Turtles (N=10) were euthanized to remove their brains and permit suction-electrode stimulations of their third cranial nerves (nIIIs). Dorsal parts of their orbits were carefully dissected to expose ciliary ganglions for drug application. Stimulations were done with current pulses of 1ms in 100Hz train pulses, and different microamplitudes (1-400 $\mu$ A) were tested. An infrared video camera captured eye images, and pupil width measurements were stored over time on a computer system. After application of vecuronium bromide, pupil constriction was reduced, supporting our original results that nicotinic cholinergic receptors are involved. Following application of atropine, however, pupil constriction was also reduced. The results suggest that parasympathetic postganglionic cells of the ciliary ganglion in red-eared sliders use both nicotinic and muscarinic receptors to signal pupil constriction. (141)

**Lieb, David A.<sup>1\*</sup>, Raymond W. Bouchard<sup>2</sup>, Robert F. Carline<sup>3</sup>, Ted R. Nuttall<sup>4</sup>, John R. Wallace<sup>5</sup>, and Carrie L. Burkholder<sup>6</sup>.** <sup>1</sup>Pennsylvania Fish & Boat Commission/Western Pennsylvania Conservancy, Bellefonte, PA 16823; <sup>2</sup>Patrick Center for Environmental Research, The Academy of Natural Sciences, Philadelphia, PA 19106; <sup>3</sup>Pennsylvania Cooperative Fish & Wildlife Research Unit, U.S. Geological Survey Biological Resources Division, The Pennsylvania State University, University Park, PA 16802; <sup>4</sup>Lock Haven University, Lock Haven, PA 17745; <sup>5</sup>Millersville University, Millersville, PA 17551; <sup>6</sup>CET Engineering Services, Harrisburg, PA 17112. *Conservation and Management of Crayfishes: Lessons from Pennsylvania* – North America supports a diverse, ecologically important crayfish fauna that is highly threatened. Unfortunately, up-to-date information is scarce, limiting the accuracy of conservation classifications and hindering management. In Pennsylvania and nearby states, recent efforts combined with historical data allowed us to accurately classify several crayfishes and develop management strategies for those species. Due to rarity and proximity to urban centers and introduced crayfishes, *Cambarus (Puncticambarus) sp.*, an undescribed member of the *Cambarus acuminatus* complex, is critically imperiled in Pennsylvania and possibly range-wide. *Orconectes limosus* is more widespread; however, recent losses have been substantial, especially in Pennsylvania and northern Maryland, where its range has been reduced by > 200 km. Introduced congeners likely played a major role in those losses. Although extirpated from some areas, *Cambarus bartonii bartonii* remains widespread and is not an immediate conservation concern. In light of these findings, specific conservation and management initiatives aimed at preventing crayfish invasions are presented. The need for methods to eliminate exotics and monitor native stocks is also discussed. Although tailored to a specific fauna, these ideas have broad applicability and would probably benefit many North American crayfishes. (55)

**Linden, Lara, Elisa Angione\*, Jedediah Seltzer, Durwood B. Ray, and Frederic J. Brenner.** 100 Campus Drive, Grove City College, Grove City, PA 16127. *Investigating Maternal Genetic Variance in Rural and Urban White-tailed Deer Populations with mtDNA D-Loop Haplotypes.* – A limited number of studies involving electronic monitoring suggest that female white-tailed deer (*Odocoileus virginianus*) exhibit philopatric behavior, ranging only a few square kilometers within their lifetime, whereas male deer are known to range in areas of 80 square km. Studies of mitochondrial DNA genetic variation to independently determine this movement pattern are limited. Mapping variations within the D-loop control region enables haplotype identification and comparison. We have shown that deer within herds from three municipal parks in Dayton, Ohio are more closely maternally related to each other than rural herds in Mercer County, Pennsylvania. These studies show higher percent homology of haplotypes within parks, but less homology between the parks, and dissimilarity between Dayton and Mercer County haplotypes. Recently, we have added two other sampling locations: Presque Isle State Park and the surrounding city of Erie, PA. To date, studies at Grove City College have obtained 19 complete D-loop sequences – each a novel haplotype – and have published 12 of these so far on the NCBI GenBank. The data indicate surprising genetic diversity within whitetail deer populations in these urban and rural settings of Ohio and Pennsylvania. (76)

**Lorgunpai, Songprod\* and Lawrence Mylin.** Messiah College, Grantham, PA 17027. *An Improved Restriction Analysis Exercise for an Introductory Molecular and Cellular Biology Course* -- To improve the learning experience for students in an introductory biology course (BIOL160) designed for science majors at Messiah College, restriction endonuclease cleavage sites within the bacterial plasmid pGLO were sought that would allow students to diagnose the presence and/or orientation of the GFP-encoding insert. Such sites were found in pGLO using New England Biolabs NEBcutter 2.0, and the presence of the predicted

sites and suitability of the resulting restriction patterns were confirmed using agarose gel electrophoresis. Recombinant plasmids containing the GFP gene inserted in the reverse orientation (relative to pGLO) or lacking the GFP insert were generated. Three recombinants were cleaved with two suitable endonucleases (*Hind*III or *Bam*HI) to produce restriction patterns appropriate for structural comparison and demonstration. These findings were used to revise the restriction endonuclease module of BIOL160. (54)

**Luan, Jing\***, **Brad E. Engle**, and **M. Dana Har-riger**. Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201. *Detection of Changes in Mitochondrial Integrity and Levels of GSK-3 $\beta$  in Hippocampal Mitochondria of the Triple Transgenic Mouse Model of Alzheimer's Disease*— Alzheimer's disease (AD) is a neurodegenerative disorder characterized by the cellular accumulation of amyloid beta (A $\beta$ ) and hyperphosphorylation of tau protein. However, recent evidence has shown that mitochondrial dysfunction may occur prior to AD pathology in triple-transgenic AD (3xTg-AD) model mice. Glycogen synthase kinase-3 $\beta$  (GSK-3 $\beta$ ), an enzyme abundant in neuronal cells of brain regions including the hippocampus and cortex, exhibits elevated activities in AD and has been detected in the mitochondria. Overexpressing mitochondrial GSK-3 $\beta$  *in vitro* has been further demonstrated to compromise mitochondrial functions, with its biological relevance remaining to be examined. This preliminary project aims to confirm the early occurrence of mitochondrial impairment in AD and to further determine if the event is accompanied by the overactivation of mitochondrial GSK-3 $\beta$  *in vivo*. Changes in mitochondrial levels of phospho-Tyr-216-GSK-3 $\beta$  and phospho-Ser9-GSK-3 $\beta$  during AD progression are being measured along with the functional integrity of mitochondria, as indicated by the percentage of polarized mitochondria, the fluctuation frequency of mitochondrial membrane potential, and the mean mitochondrial membrane potential. Three groups of 3xTg-AD

mice; 3, 6, and 8 months of age, are being analyzed with corresponding control groups. The results may enhance our understanding of mitochondrial dysfunction and protein dysregulation in early AD stages. (26)

**Mageoney, Catherine\***, **David Dunbar**, and **Melinda Harrison**. Cabrini College, Radnor, PA 19087. *Comparative Genomic Characterization of a Novel Mycobacteriophage*—Mycobacteriophages are viruses that infect a class of bacteria called mycobacteria such as *Mycobacterium smegmatis* and *Mycobacterium tuberculosis*. In spite of the fact that mycobacteriophages are the most abundant life form in the biosphere they remain relatively poorly characterized. Currently, there are over 80 mycobacteriophages that have been sequenced and comparatively analyzed. Marvin, a mycobacteriophage isolated and characterized by students at Cabrini College is very unique and unlike that of any other of the currently characterized mycobacteriophages. Of the 111 genes in the genome, only 22 are similar to that of other mycobacteriophage genes. The remaining genes have no known homologs in the Genbank database. Marvin also has many unique properties that have not been seen in other mycobacteriophages such as structural proteins that look unlike those of other mycobacteriophages. Studies are currently underway to determine protein expression patterns during different stages of its lifestyle as a way of determining the roles of its putative genes. Studies are also underway to determine the function of Marvin's unique genes using gene knockout protocols. (166)

**Mahan, Carolyn\***, and **Kevin Pulver**, Biology and Environmental Studies, Penn State Altoona, 209 Hawthorn, Altoona, PA 16601 Environmental Studies Program, Penn State Altoona, Altoona, PA 16601. **Jim Finley**, Professor of Forestry, School of Forest Resources, Penn State, University Park, PA 16801 *Forest condition in and around a site cleared for a Marcellus well pad and a wind turbine—a case study in north-central Pennsylvania*— We examined the effects of forest disturbance on forest condition and composition in an area surrounding

a wind turbine development and a Marcellus shale development in northern Centre County. Data on forest regeneration, understory composition, and overstory composition was collected and examined within disturbed sites (1 turbine and 1 Marcellus well pad site) and 60 m into the surrounding forest. Preliminary data indicate that downed woody debris is significantly higher at the edge interface of the sites than in the surrounding forest and herbaceous cover is significantly higher near the disturbed areas that at 60 m from the disturbance. This case study demonstrates the need for further research to understand the potential effects of forest disturbance on forest health and to help develop best management practices for restoring sites disturbed due to energy development in the forested regions of Pennsylvania. (127)

**Mahoney, Chelsea\*, Kayla Hager, and André Walther.** Cedar Crest College, Allentown, PA 18104. *Identification of novel interactions between Replication Protein A and cellular proteins in the Budding Yeast *Saccharomyces cerevisiae** – Replication Protein A (RPA) is a highly conserved, single stranded DNA binding protein involved in DNA replication, repair, and recombination. RPA is composed of three subunits: RPA1, RPA2 and RPA3, and is known to interact with a number of proteins involved in cellular processes. To better understand the cellular functions of RPA, we are attempting to identify novel proteins that physically interact with RPA from the budding yeast *Saccharomyces cerevisiae* using the Yeast 2-Hybrid Assay, which is specifically designed to identify protein-protein interactions. We developed expression vectors that fuse the GAL4 DNA binding domain (GAL4DB) to either the RPA2 subunit or the RPA3 subunit from yeast. Vectors expressing these fusion proteins were combined with a random library of yeast proteins fused to the GAL4 activating domain (GAL4AD) and transformed into a strain of *S. cerevisiae*. Proteins that physically interact with RPA were identified by the activation of specific reporter genes that were expressed only when a GAL4DB-RPA fusion

protein interacted with an unknown protein fused to GAL4AD. We have used this system to identify novel proteins that physically interact with RPA2 and are in the process of identifying proteins that interact RPA3. (151)

**Malmberg, Eric J.\*, Frank R. Wendt, Corien Bakermans, and Susanne Douglas.** Altoona College, Pennsylvania State University, Altoona, PA 16601 and the NASA Jet Propulsion Laboratory, Pasadena, CA. *Isolation of Microorganisms from Antarctic Permafrost Soils* – Although Antarctica has a harsh environment (cold, dry, frozen, low nutrients, etc.), microorganisms are able to live and survive. We examined permafrost (permanently frozen) soil samples from University Valley (UV), which is dry and cold, and Taylor Valley (TV), which is warmer and wetter, to characterize species of microorganisms that could be cultured in the laboratory. Soil samples were diluted in phosphate buffered saline solution and spread on agar plates of Luria broth, M9 mineral medium (with acetate as the sole carbon source), and a medium specific for *Acidobacteria* (pH 4). After several months of incubation at 4°C, no growth was observed on any medium inoculated with UV permafrost soils. In contrast, an average of 9600, 6600, and 1700 cfu per g of soil were recovered on LB, M9 and *Acidobacteria* media, respectively. Ten to twelve isolates were chosen at random from each medium for further analysis, including sequencing of the 16S rRNA gene. Isolates will also be compared to clone libraries of the 16S rRNA gene amplified from bulk extracted DNA. Considering that isolates were only obtained from TV permafrost soils, the relatively warmer and wetter conditions are likely more conducive to microbial growth and survival in Antarctica. (175)

**Maloney, Brittany, Courtney Sperger, and Kenneth Klemow.** Wilkes University, Wilkes-Barre, PA 18766. *Developing a podcast trail guide for Nuangola Bog, Luzerne County, PA* - The development and maturation of new digital technologies have great potential to improve the public's understanding of natural history and ecology. For the

past four years, faculty and students at Wilkes University in Wilkes-Barre, PA have engaged in a Podcast Trail Guide initiative. Students have created image-enhance podcast series for selected trails in northeastern Pennsylvania. This project involves creation of a podcast trail guide for Nuangola Bog, which is a cranberry bog owned by Wilkes University in central Luzerne County, immediately south of Lake Nuangola. This guide consists of fifteen episodes, each lasting 45-100 seconds, covering a diversity of topics including lake formation and ecology, plants and animals of the bog, and human impacts. Each episode consists of spoken narration and digital images pertaining to the topic under discussion, and will be linked to a station marker at the site. The podcasts are made available free of charge at Wilkes University's iTunesU website (<http://itunes.wilkes.edu>). We seek to develop a collaborative of podcast trail guide creators, and welcome partners. (110)

**Manchanayakage, Renuka and Aaron Jones\***. Susquehanna University, Selinsgrove, PA 17870. *Electroreduction of Activated Alkenes in Room Temperature Ionic Liquids* - Electrosynthesis remains an attractive eco-friendly process since the use of electrons as a reagent does not involve the formation of any side-products. Room temperature ionic liquids (RTILs) can be used to replace the volatile organic solvents used in electrosynthesis increasing its experimental appeal. This will also avoid the addition of supporting electrolyte owing to inherent conductivity of RTILs. In this project, we are interested in studying electroreduction of activated alkenes in RTILs. The compound, 2-cyclohexen-1-one was first subjected to electroreduction in ionic liquids using an undivided electrochemical cell. A platinum cathode and a sacrificial tin anode were used in these reactions. Following electrolysis, the organic products were extracted by treating the electrolytic solution with diethyl ether. A mixture of monomeric product, cyclohexanone and di-

meric product, (1,1'-bicyclohexyl)-3,3'-dione was obtained. The product structures were confirmed by IR and NMR spectroscopy. The experiments are also underway to apply this method for other activated alkenes. (139)

**McQuilken, Molly\*** and **André P. Walther**. Cedar Crest College, Allentown, PA 18104. *Replication Protein A Phosphorylation Plays a Role in Telomere Length Maintenance in the Budding Yeast *Saccharomyces cerevisiae** - Telomeres are nucleoprotein structures that protect chromosomal ends from degradation in humans and yeast. Replication Protein A (RPA) is a highly conserved, single-stranded DNA binding protein that is phosphorylated in a cell cycle dependent manner and involved in telomere synthesis. We generated strains of *Saccharomyces cerevisiae* containing mutations in the N-terminus of *RFA2* subunit of RPA that inhibit or mimic constitutive phosphorylation, and examined telomeres using Southern analysis. Mutations that cause constitutive RPA phosphorylation (*rfa2-Asp*) lead to short telomeres, while mutations that prevent phosphorylation of RPA (*rfa2-Ala*) lead to long telomeres. We are identifying the genetic requirements for these phenotypes by mutating known telomere maintenance genes (*KU70* and *TEL1*) in these mutant RPA strains. Telomeres in *rfa2-Asp Δku70* strains are shorter than *Δku70* indicating that when RPA is phosphorylated, telomeres shorten in a *KU70* independent fashion. However, telomere lengthening in *rfa2-Ala* strains is dependent on *KU70*. The mutation *rfa2-Asp* is non-epistatic with *Δtell1*, and *rfa2-Ala*-dependent telomere lengthening is not dependent on *TEL1*. Our results indicate that RPA phosphorylation plays an important role in telomere length regulation, and that there are complex genetic relationships between RPA and the different telomere maintenance genes that regulate telomeres within the cell. (32)

**Mibroda, Julie E.\*, Jeffery L. Larkin, and Joseph E. Duchamp**, Indiana University of Pennsylvania, Indiana, PA 15705. *Understanding factors that influence the distribution of the endemic shorthead garter snake (*Thamnophis brachystoma*) in northwestern Pennsylvania* - *Thamnophis brachystoma* is endemic to northwestern Pennsylvania and adjacent southwestern New York. This species has one of the most restricted ranges of any snake in the U.S., with approximately 90% lying within 14 Pennsylvania counties. Although recent surveys indicate that *T. brachystoma* is relatively abundant in some areas of Pennsylvania, there is evidence of population declines likely due to habitat loss and degradation. Previous work provided a broad description of *T. brachystoma* habitat which includes open areas with low vegetation (e.g. old fields, marsh edges, roadside banks) and cover objects such as rocks, logs or human-generated litter (e.g. corrugated tin, plywood, tarps). Nonetheless, specific requirements that may contribute to the restricted range of this species are unknown. In 2010, we conducted *T. brachystoma* occupancy surveys at 40 sites in northwestern Pennsylvania. We detected 81 *T. brachystoma* at 18 of 40 sites surveyed. Detailed habitat measurements were also recorded at each site and data are being incorporated into an occupancy model. A better understanding of *T. brachystoma* habitat requirements and areas of occupancy is a necessary first step toward the development of an appropriate species-specific conservation strategy. (44)

**Mickey, Scott E. and Les D. Murray\***. Penn State – Abington, Abington, PA 19001. *Hawk Feeders?: Estimates of Predation Rates by Hawks at Bird Feeders in a Suburban Area* – In the past 20 years some hawks have become more common in urban and suburban areas. One potential reason for the increase of hawks in these areas might be the presence of avian and mammalian prey at bird feeders. We recorded hawk activity at five different feeding stations in the Philadelphia metropolitan area during late December 2010 and January 2011 using digital video cameras. Weather-proof high resolution color digital video cameras were secured

to trees and connected to digital video recorders (DVR) programmed to record motion. The camera and DVR were powered by a 12-V sealed lead-acid battery. Four species of hawks visited the feeders: sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and red-shouldered hawk (*Buteo lineatus*). We reviewed video from 75 daylight hours and observed 15 visits and 6 predation attempts by hawks giving a rate of 0.8 attempts per day. Hawks successfully captured prey during 33% of attempts giving a rate of one successful predation every 4 days. Our results show that hawks visit feeders at a higher rate than reported by other studies and that availability of prey in concentrated areas might lead to increases of hawks in urban and suburban areas. (120)

**Miller, William\* and David K. Foster**. Messiah College, Grantham, PA 17027. *A Comparative Study of Fire Ecology and Small Mammal Effects on a Puget Sound Shortgrass Prairie Remnant*. We asked: 1) how prescribed burns affect native vegetative cover in an experimental shortgrass prairie remnant and 2) how small mammal populations drive community dynamics within this system. A two year comparative study was performed on a Puget Sound shortgrass prairie remnant during the summers of 2009 and 2010. The purpose of this study was to assess the change in the vegetative community between the summers of 2009 and 2010, and to resurvey the small mammal population. Burned plots were shown to have a lesser index of community similarity (74%) as compared with controlled plots (87%) from 2009 samplings to 2010 samplings. Shrubs also showed a decrease in overall relative density (17.64%) as well as in burned plots (21.07%). Forbs showed increases in relative density overall (14.41%) and in burn plots (16.46%). *Peromyscus maniculatus* showed a dramatic increase in population between 2009 (N=9.04) and 2010 (N=31.17). *Microtus townsendii* increased marginally from 2009 (N=1-2) to 2010 (N=2-4). *Sorex vagrans* populations dropped from N=6 in 2009 to N=1 in 2010. (69)

**Mogle, Catherine A.\* and Dr. Audrey J. Ettinger.** Department of Biological Sciences and Neuroscience Program, Cedar Crest College, Allentown, PA 18104. *The Relationship Between Sex and Aggression in a Cichlid Fish Model System* -- Understanding and predicting the behavior of animals has been important throughout human history, as it allows for insight into human behavior. Cichlid fish, including *Rocio octofasciata*, are ideal model organisms for formal behavioral studies because they have a finite repertoire of behaviors that are easy to observe, and their environment is easily manipulated in the laboratory. Previous work in our laboratory has demonstrated social dominance, characterized by the guarding of a territory within the tank using aggressive behaviors, in individuals of both sexes, but it remains unclear which sex is most likely to become dominant and what factors control dominance in each sex. The current study aims to determine whether there are differences in male and female aggressive behavior, and, specifically, which sex is more likely to be territorial. Adult aggressive behaviors were observed in pairs of fish. Initial results suggest that in pairs of unequal initial size, the dominant fish may be male or female, while in size-matched pairs, males become dominant. This data will contribute to a better understanding of aggressive behavior and how it is used in varying social situations. (90)

**Morra, Christina\* and Amy J. Reese** Department of Biological Sciences, Cedar Crest College, Allentown PA, 18104. *Why does Cryptococcus neoformans need alpha-1,3-glucanase?* - Cryptococcus neoformans is a fungus that can cause infections in immunocompromised individuals. One of the primary virulence factors of C. neoformans is its polysaccharide capsule, which protects the yeast cell from the human immune system. The capsule is attached to the organism via cell wall alpha-1,3-glucan. This research focuses on the alpha-1,3-glucanase enzymes, which are thought to break down and remodel the alpha-1,3-glucan. The purpose of this project is to better understand the roles of these genes by overexpressing them in bacteria and studying their activity. The cDNA

regions thought to encode catalytically active regions of the gene sequences were amplified. These truncated sequences (lacking a predicted transmembrane domain) were then inserted into an E. coli expression vector. The truncated cDNA segments of each of the four genes have been successfully amplified, ligated into the host vectors, and transformed. The resulting constructs are being screened. Correct plasmids will be expressed and the resulting protein products analyzed. By understanding the role(s) of alpha-1,3-glucanases in cryptococcal capsule binding and regulation, we may better be able to control infections caused by this fungus. (171)

**Moyer, Zachary\* and Daniel Ressler.** Susquehanna University, Selinsgrove, PA 17870. *Feasibility of Micro Wind Turbines for Home use in Central Pennsylvania* – Alternative energy shows up in the spotlight more and more each day. Wind Energy in particular can be a resource that will never run out and the price will never go up. Not every part of the country is suitable for large wind farms, so information on smaller home units, as a viable power option, is needed. In this particular experiment a micro wind turbine system was tested for its efficiency for household use. The results show that for this particular area, Snyder County, these micro turbines may not be a viable option for home use. Although they are not an option to power an entire household, there are other options that these turbines would be useful for. Since the available wind power over the month of December 2010 was an average of 10 watts per day per unit. These turbines would be well suited for use in charging electric fences and also batteries due to their low cost and mobility. (137)

**Mulugeta, Surafel\* and Steven Mauro.** Mercyhurst College, Erie, PA 16546. *The active ingredient in anti-depressants decreases bacterial and viral content in a freshwater aquatic ecosystem*- Fluoxetine is the active ingredient in anti-depressant drugs and has been shown to accumulate in recreational waters at levels that have the potential to negatively impact aquatic organisms including

fish, algae, and crustaceans. However, the impact of fluoxetine on aquatic microbes remain poorly understand. In this study, we examined how fluoxetine influences overall and specific bacterial and viral levels in the recreational waters of Presque Isle State Park in Erie, Pennsylvania. Our results demonstrate that fluoxetine is present in these waters and can decrease total bacterial and viral levels. Further, our studies comparing different bacterial types suggests that fluoxetine cytotoxicity is not uniform, indicating that fluoxetine presence impacts microbial aquatic ecosystems in a complex way that should be further examined. **(61)**

**Mulugeta, Surafel\*, Eric Clark, Drew Spacht, Gillian Jones, Irfan Haider, and Steven Mauro.** Mercyhurst College, Erie, PA 16546. *The active ingredient in anti-depressants decreases bacterial and viral content in a freshwater aquatic ecosystem* - Fluoxetine is the active ingredient in anti-depressant drugs and has been shown to accumulate in recreational waters at levels that have the potential to negatively impact aquatic organisms including fish, algae, and crustaceans. However, the impact of fluoxetine on aquatic microbes remain poorly understand. In this study, we examined how fluoxetine influences overall and specific bacterial and viral levels in the recreational waters of Presque Isle State Park in Erie, Pennsylvania. Our results demonstrate that fluoxetine is present in these waters and can decrease total bacterial and viral levels. Further, our studies comparing different bacterial types suggests that fluoxetine cytotoxicity is not uniform, indicating that fluoxetine presence impacts microbial aquatic ecosystems in a complex way that should be further examined. **(99)**

**Mustazza, Joseph\* and Thomas M. McGuire.** Penn State Abington, Abington, PA 19001. *The Anti-Proliferative Effect of Human Chorionic Gonadotropin on Breast Epithelial Cells May Be Mediated Through a Reactive Oxygen Species Pathway* – The hormone human chorionic gonadotropin (hCG) has been shown to have anti-proliferative effects on breast epithelial cells. The mechanism of this anti-proliferation is still un-

known. One possible explanation could be through a metabolic pathway involved in the conversion of reactive oxygen species into hydrogen peroxide and water by manganese superoxide dismutase (MnSOD), catalase (CAT), and glutathione peroxidase (GPX), respectively. However, this same pathway has an alternate outcome if it is mediated by myeloperoxidase (MPO). In order to determine if these metabolic pathways are activated, the gene expression was determined for each enzyme using RT-PCR from four breast epithelial cell lines. In all of the cell lines, expression of MnSOD, CAT, and GPX was clearly evident, while MPO was not expressed. Protein expression will also be determined by western blots. These results may implicate these pathways in the anti-proliferative effects of hCG. **(158)**

**Mylin, Lawrence\*, Songprod Lorgunpai, Michele Pedersen, Robyn Smith, Brandon Neal, and Michael Shin.** Messiah College, Grantham, PA 17027. *Two Lab Modules Designed for a New Introductory Molecular and Cellular Biology Course* – The Messiah College Biological Sciences Department recently redesigned the first year series of introductory courses for science majors. This included new laboratory modules designed for use in the first semester Molecular and Cellular Biology course. Two will be reviewed. The first allows students to use a simple, low tech method to investigate factors that influence the rate of an enzyme catalyzed reaction. Hydrolysis of sucrose by yeast invertase releases reducing sugars whose accumulation can be monitored in a semi-quantitative fashion using Benedict's reagent. Students measure the concentration of reducing sugars in timed samples removed from reactions by comparison with a set of samples prepared in advance using known amounts of a mixture of fructose and glucose. In a second module, students use restriction analysis to analyze the structures of pG-LO-derivative plasmids isolated from glowing or non-glowing, ampicillin-resistant bacteria. In the original version, plasmids isolated from non-glow-

ing bacteria lacked the GFP insert. In a revised module, an additional plasmid is provided that contains the GFP insert, but is unable to express the GFP protein because the fragment is inserted in the reversed orientation. (53)

**Nacarelli, Timothy\*** and **Sheryl L. Fuller-Espie.** Cabrini College, Radnor, PA 19087. *Changes in Mitochondrial Membrane Potential and Reactive Oxygen Species Production Induced by Pathogen-Associated Molecular Patterns in the Earthworm Eisenia hortensis* - Changes in mitochondrial membrane potential ( $\Delta\Psi_m$ ) and reactive oxygen species (ROS) production in the coelomocytes of *E. hortensis* was investigated using flow cytometric analysis. Pathogen associated molecular patterns (PAMPs) including zymosan, flagellin, and peptidoglycan were used to induce the early apoptotic events of  $\Delta\Psi_m$  and ROS production. JC-1 and DHR 123 were employed as fluorescent indicators of  $\Delta\Psi_m$  and ROS production, respectively. Also, 7-AAD, a viability dye, was used to restrict analysis to healthy and early-apoptotic cells. Flow cytometric statistical analysis restricted to the amoebocyte populations of the earthworm coelomocytes using a student's *t*-test ( $p \leq 0.05$ ) compared the spontaneous apoptosis control to the PAMP-treated samples for a loss of  $\Delta\Psi_m$  or ROS production. The PAMP that predominantly caused a statistically significant loss of  $\Delta\Psi_m$  was zymosan. From conducting four assays which tested a total of 40 earthworms, 76% of the earthworms exhibited a statistically significant loss of  $\Delta\Psi_m$  from incubation with zymosan. We hypothesize that earthworm coelomocytes possess PAMP-induced signal transduction pathways causing a  $\Delta\Psi_m$  and ROS production which may be instrumental during innate immune defenses to facilitate eradication of intracellular reserves of pathogens. (28)

**Nole, Kirsten\*** and **André Walther.** Cedar Crest College, Allentown, PA 18104. *Replication Protein A Phosphorylation Regulates Nucleotide Excision Repair of DNA Damage Caused by Ultraviolet Light in the Budding Yeast Saccharomyces cerevisiae* - Xeroderma Pigmentosum (XP) is an

autosomal, recessive disease caused by a dysfunctional Nucleotide Excision Repair (NER) pathway that fixes DNA damage caused by Ultraviolet (UV) light. XP patients have increased sensitivity to light, disfiguring pigmentation, as well an increase in the chances of developing cancer. The yeast *Saccharomyces cerevisiae* is a eukaryotic, single celled model organism that has a NER repair pathway that is very similar to humans. One protein that is known to play an important role in NER is the highly conserved Replication Protein A (RPA). RPA is phosphorylated in response to UV damage suggesting a role in NER regulation, so RPA was mutated to look either constitutively phosphorylated or unphosphorylated to examine effects on repair. These mutant forms of RPA were integrated into yeast and the ability of cells to survive in the presence of UV damage was measured. We found that constitutive phosphorylation leads to decreased viability in the presence of UV damage. RPA mutations were then combined with mutations in all known NER genes to identify genetic interactions. We have identified complex genetic interactions between RPA and multiple NER genes indicating that the phosphorylation of RPA plays a role in regulating NER in yeast. (30)

**O'Donnell, Erin M.\* and Dr. Audrey J. Ettinger.** Department of Biological Sciences; Cedar Crest College; Allentown, PA 18104. *Observing the rate of rod photoreceptor differentiation and the migration of newly proliferated rod progenitors in Rocio octofasciata* - *Rocio octofasciata*, the Jack Dempsey cichlid fish, is a great model for studying the development of retinal cells, a question important for both clinical and basic science. While cell types, cell organization, and molecular mechanisms are largely conserved between humans and cichlids, fish eyes grow continually throughout the animal's life. In order to maintain visual acuity during growth, new retinal cells are added from a pool of adult stem cells. Studying the timing and location of stem cell differentiation into rod photoreceptors in *R. octofasciata* will result in a better understanding of the mechanisms that regulate these stem cells. Here, injected bromodeoxyu-

ridine (BrdU) was used as a marker for dividing stem cells in the retina. We have collected retinas at variable times after injection and have used immunohistochemistry to stain for stem cells (BrdU) and rod photoreceptors (rhodopsin). The survival time at which double labeled cells first appear indicates the time required for differentiation to occur. The position of dividing and recently differentiated cells within the retina can also be observed, allowing us to study the effects of the extracellular environment on these cells. (142)

**Olier, Samantha\*, René Norman, and André P. Walther.** Cedar Crest College, Allentown, PA 18104. *Identification of phosphorylation sites important for Replication Protein A DNA repair functions in the budding yeast *Saccharomyces cerevisiae** – RPA is a single-stranded DNA binding protein consisting of three subunits (*RFA1*, *RFA2*, and *RFA3*). RPA is highly conserved among all eukaryotes, so our lab uses the budding yeast *Saccharomyces cerevisiae* as a model organism to better understand human RPA. The *RFA2* subunit contains 10 serines and threonines that can be phosphorylated during DNA repair and replication suggesting a regulatory role for these sites. We generated yeast containing mutant forms of Rfa2p with the 10 serines and threonines mutated to either aspartic acids to mimic hyper-phosphorylated Rfa2p (*rfa2-Asp*) or alanines to mimic constitutive dephosphorylation (*rfa2-Asp*) and examined effects of these mutations on DNA repair. These mutations lead to increased sensitivity to different type of DNA damage indicating that RPA phosphorylation plays a role, however the specific phosphorylation sites that are responsible for the phenotypes were still unclear. To narrow down which serines and threonines were responsible for the defective repair phenotypes, we generated multiple mutant forms of Rfa2p with subsets of mutated serines and threonines within the cluster of 10 serines and threonines using PCR site-directed mutagenesis and have examined the effects of these mutations on multiple repair pathways. (150)

**Ombrello, Teresa A.\*, Jane E. Huffman.** Northeast Wildlife DNA Laboratory. East Stroudsburg University, East Stroudsburg, PA 18301. *Evaluation of the Genetic Diversity and Paternity of New Jersey and Pennsylvania Black Bears (*Ursus americanus*) Using Eight Polymorphic Microsatellite Loci* – Black bear (*Ursus americanus*) populations have been expanding in New Jersey since the mid 1900s due to legislative protection and possible recolonization by individuals from Pennsylvania. This study investigated the diversity found within the New Jersey black bear population and determined the genetic influence by bears from surrounding states. The paternities of New Jersey litters were also analyzed. Tissue samples were collected from northwest New Jersey through the state's Division of Fish and Wildlife. Samples were also collected from northeast Pennsylvania check stations during the annual black bear hunt. DNA was extracted from all tissue samples, and using PCR, the primers for eight microsatellite loci (G10L, Mu50, G10P, G10H, G10O, G10J, G10C and Mu59) were amplified and later genotyped. The genotypes of black bears from both states were then compared in order to determine the genotype profile contributed by Pennsylvania black bears during the repopulation of New Jersey. An average of 9.25 and 11.13 alleles per locus were found in New Jersey and northeast Pennsylvania, respectively. The expected and observed heterozygosities were calculated, and a Hardy Weinberg equilibrium test was performed. Twenty-six sow-cub family units from New Jersey were analyzed, and three were shown to exhibit multiple paternities. (75)

**Pabian, Sarah E.\*, and Margaret C. Brittingham.** Pennsylvania State University, University Park, PA 16802. *10 years of CREP: evaluating the benefits of the Conservation Reserve Enhancement Program on grassland/shrubland birds* – The Conservation Reserve Enhancement Program (CREP) was initiated in 2000 to offer farmers incentive to take highly erodible and environmentally sensitive land out of production, with the goals of improving water quality, erosion control and enhancing wildlife habitat quality. Initial CREP enrolled lands

are now approaching the end of their agreements, and the effectiveness of the program needs to be evaluated. The Game Commission collected data spanning the past ten years of the program on the abundance and distribution of birds across southeastern Pennsylvania. We analyzed the 2009/2010 data and observed positive CREP effects on the distributions of several species including ring-necked pheasants (*Phasianus colchicus*), eastern meadowlarks (*Sturnella magna*) and field sparrows (*Spizella pusilla*). We also compared the abundances of grassland/shrubland species from the beginning of the program (2001/2002) with those in 2009/2010. We observed a positive CREP effect on the abundance changes of several of the same species. Specifically, eastern meadowlark populations declined in areas with no or low CREP cover, but remained constant in areas with high CREP cover. By observing CREP benefits in both habitat associations and population changes, we provide strong evidence that the CREP program has benefitted several bird species. (36)

**Palmer, L.M.\*, J.C. Kauffman, and J.E. Huffman.** Northeast Wildlife DNA Laboratory, East Stroudsburg, PA 18301. *Genetic Structure of River Otter (*Lontra canadensis*) Populations in NJ and PA-* The North American river otter (*Lontra canadensis*) historically was found in freshwater riparian and brackish coastal habitats throughout most of North America. The species became locally extinct in many areas of PA in the early 1900s. River otters were reintroduced into northeastern PA with animals obtained from Louisiana, Maryland, Michigan, New Hampshire, New Jersey, and New York. To evaluate the genetic structure of otters in PA and NJ, tissue samples were collected from 93 otters harvested by professional trappers in NJ and from accidental capture and vehicle strikes in PA. DNA was extracted from each sample and was amplified using eight polymorphic microsatellite loci. The samples were run on an ABI 3130 Genetic Analyzer and analyzed with Gene Mapper 3.7 software. Statistical analysis was completed using GENEPOP 4.0 software. The number of alleles occurring at each locus ranged from five to

fourteen in Pennsylvania and New Jersey. Initial results suggest that New Jersey and Pennsylvania exhibit sufficient genetic diversity and variability. Calculated  $F_{IS}$  values indicated that Pennsylvania and New Jersey were out-breeding at all loci. (74)

**Pankowicz, Francis\* and Jane F. Cavender.** Elizabethtown College, Elizabethtown Pa 17022. *Correlation Between p53 and Rb-Binding Activities of SV40 T-Antigen and the Ability to Block Differentiation of Pre-Adipocytes-* Cellular differentiation is the basis for higher ordered organisms, yet little is known about the mechanisms that drive this process. This project is an expansion upon the work of Higgins, (2000) that showed the SV40 oncoprotein, T antigen (Tag), effectively abrogated the differentiation of 3T3-L1 fibroblasts to mature adipocytes. They found that two regions/activities of T antigen potentiated the block of differentiation. The N-terminal Tag function that sequesters the retinoblastoma gene product (Rb); and an unknown activity marked by amino acids (aa) 121-708 independently blocked differentiation. We hypothesize that this unknown activity involves binding and inactivating the p53 tumor suppressor protein. p53-binding has been mapped to two Tag regions (aa351-450 and 531-626). The 3T3-L1 cell line was stably transfected with T antigen p53-defective binding-mutants Tdl382-400 and Tdl501-550. Differentiation was induced in these lines, and our data, in combination with Higgins, indicate that free p53 and Rb are necessary to promote adipocyte differentiation. Currently, ongoing investigations address whether Rb- and p53-binding and sequestration are the only activities involved in preventing adipocyte differentiation. By better understanding how these cells develop, it is possible to better understand their role in obesity and the associated health concerns facing many people today. (8)

**Paré, Monique M<sup>1\*</sup>, Nicole Ward<sup>2</sup>, M. Dana Harriger<sup>1</sup> and Catherine Santai<sup>1</sup>.** <sup>1</sup>Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201. <sup>2</sup> Case Western Reserve University, Department of Dermatology, Cleve-

land, OH 44106. *The Efficacy of Dietary Supplementation of Polyunsaturated Fatty Acids on Psoriasis in the Psoriasisform Murine Model KC-Tie2* - Psoriasis is an autoimmune, inflammatory skin disorder affecting ~3% of the population worldwide and has broad physical and mental effects on many dimensions of health-related quality of life. This skin disorder is characterized by extensive angiogenesis, increased inflammatory infiltrate in the skin and localized raised hypertrophic epidermal plaque formation. Conventional treatments for controlling psoriasis have significant and adverse side effects ranging from itching and erythema to increasing the risk of developing various types of cancer. Concerns over these have piqued interest in the investigation of alternative holistic therapies. Studies suggest that  $\omega$ -3 and  $\omega$ -6 polyunsaturated fatty acids (PUFAs) suppress or stimulate inflammation respectively. Using a well characterized murine model of psoriasisform skin inflammation (KC-Tie2 animals), we compared the efficacy of dietary supplementation with  $\omega$ -3 and  $\omega$ -6 PUFAs as an alternative treatment for psoriasis. Following 8 weeks of dietary modification, disease resolution was examined by measuring the levels of epidermal thickness (acanthosis), angiogenesis and the levels of cutaneous immune cell infiltrate. The results of this study may provide support for alternative approaches in lieu of or in combination with conventional treatments of psoriasis. (24)

**Pierce, Diana H.\* and Angela R. Hess.** Bloomsburg University Bloomsburg PA. *Comparative expression profiles of Eph receptors and ephrin ligands in the human keratinocytes and melanocyte* — Under homeostatic conditions, Eph receptors and ephrin ligands are specific mediators of cellular communication. Once ligand/receptor interaction occurs, phosphorylation cascades are activated. These signaling events are critical in bone repair, embryonic development, and intestinal epithelial communication. Although Eph/ephrins are well documented in other tissues, little is known regarding skin regulation. It is unknown if Eph/ephrins are necessary for keratinocyte and melanocyte homeostasis within the epidermis. Communica-

tion between keratinocytes and melanocytes is modulated through growth factors, gap junctions and signal transduction mechanisms that could be influenced by Eph/ephrins interactions. Established expression profiles confirm Eph/ephrins within human keratinocytes; however, Eph/ephrin expression in melanocytes is largely unknown. The aim of this study was to establish an expression profile between normal human keratinocytes and melanocytes which could be compared to the profile of Eph/ephrins expressed by human melanoma tumor cells. Understanding the Eph/ephrin expression profiles may serve as a baseline for signal transduction research and gene regulation in melanoma. PCR data confirmed the expression of EphA1, EphB2, ephrin-B1, and ephrin-B3 in keratinocytes. Comparatively ephrin-B1 and ephrin-B3 expression was identified as novel ephrins in melanocytes. Current studies are aimed to determine the functional significance of these proteins expressed by keratinocytes and melanocytes. (11)

**Pogash, Thomas\*, Soha Daher-Mansour, Weston Umstead, Francis Mayville, and Peter J. Leonard.** DeSales University, Center Valley, PA 18034. *Inhibition of Human Breast Cancer Cell Growth in Direct Response to Increasing Doses of 1,8-(Bis)Propyl Spermidine* - We exposed two human breast cancer cell lines, MCF-10F and MCF-10F-E<sub>2</sub>-Tumorigenic (kindness of J. Russo, Fox Chase Cancer Center), to concentrations of 960  $\mu$ mol, 1920  $\mu$ mol, 3840  $\mu$ mol of 1,8-(Bis)Propyl Spermidine, as well as control, to assess the effect on cell growth. The tumorigenic cell line typically demonstrates higher levels of cell transformation than the less aggressive parent line. Our results indicate that cell growth rates are inversely proportionate to increasing doses of agent applied. Inhibition of cell growth was noted within 24 hours at a threshold concentration of 960  $\mu$ mol for both MCF-10F and MCF-10F-E<sub>2</sub>-Tumorigenic cells. Complete cessation of growth was detected after 72 hours of incubation at concentrations of

1920  $\mu\text{mol}$ , 3840  $\mu\text{mol}$  for MCF-10F as well as at 3840  $\mu\text{mol}$  for MCF-10F-E<sub>2</sub>-Tumorigenic. Our results suggest that 1,8-(Bis) Propyl Spermidine may warrant further investigation as a potential chemotherapeutic agent. (15)

**Ramdaney, Aarti\***, Kara Welch\*, and K. Joy Karnas. Cedar Crest College, Allentown, PA 18104. *Molecular and Cellular Responses of Flora and Fauna to Environmental Stimuli* – In their daily lives, organisms are challenged with environmental stressors as they come in contact with naturally occurring chemicals, environmental pollutants, and infectious agents. The goal of this project was to investigate the cellular and molecular response of organisms to various environmental stimuli. The model organisms for this study were the common tomato plant, *Solanum lycopersicum*, and the tobacco hornworm, *Manduca sexta*, a known Solanaceae consumer. The focus of the study was the altered expression of several house-keeping and heat shock protein genes following exposure to environmental stimuli such as heavy metals and virulent bacteria. Initial microscopy studies allowed for the visualization of the cellular response of the hornworm hemolymph cells to the presence of various prokaryotic species. Tomato microarrays allowed for the identification of specific responsive genes in the tomato plant, and qPCR enabled correlation between the level of expression of key genes and the type of environment stimulus. The future goal of this study is to better understand the effects of heavy metal and bacteria exposure on both flora and its associated fauna. (169)

**Rehnberg, Bradley\***. York College of Pennsylvania, York, PA 17405. *Silk Webs of the Fall Webworm (*Hyphantria cunea*): Hot Spots and their Resistance to Forced Convective Cooling* – Fall webworms, *Hyphantria cunea* (Lepidoptera: Arctiidae), are gregarious caterpillars that cooperate to spin protective silk webs on sun-exposed branches of host trees. The web captures solar heat and provides a warm environment for larval development. In this study, temperature variability inside webs was related to time of day and wind speed.

Temperatures inside and outside the web were recorded once every minute by thermistor probes and Hobo H8 data loggers. Web interiors were found to be warmest in “mats” which were discrete regions characterized by dense silk, aggregations of webworms, exuviae, feces, and other materials. During daylight hours, webworms chose to reside inside or next to mats, putting themselves in very warm microhabitats. Anemometer readings at web height showed that wind speeds were variable but generally low (< 1.5 m/s). Simultaneous readings of wind speed and web temperatures indicate that forced convection does not play a significant role in reducing web temperatures. The ability of webs to provide warm alternatives to ambient air was highly variable and was dependent on each web’s orientation to the sun and the duration of access to direct sunlight. (125)

**Repasky, Stephen J.\*** PA Game Commission, Harrisburg, PA 17110. *Effects of streamside vegetation on muskrat relative abundance in Pennsylvania-Muskrat (*Ondatra zibethicus*) populations have declined in Pennsylvania and other eastern states during the last twenty-five years. Simultaneous declines in available herbaceous riparian habitat occurred due to change in farming practices, natural forest succession and the encroachment on and drainage of wetlands. Recent conservation efforts, including the Conservation Reserve Enhancement Program (CREP), have improved water quality and increased the quantity and quality of upland and riparian herbaceous vegetation. We evaluated the effects of streamside vegetation structure and composition on muskrat relative abundance in 4 physiographic units in Pennsylvania. One-hundred twenty buffered and paired non-buffered streams were sampled for muskrat relative abundance, vegetation structure and vegetation composition across 4 physiographic units. Buffered streams, vegetation structure and vegetation composition were significantly correlated with muskrat relative abundance. (111)*

**Resnick, Shoval\*, André P. Walther, and Marianne Staretz.** Cedar Crest College, Allentown, PA 18104. *The Use of p-XSC as a Chemopreventative Agent in Saccharomyces cerevisiae* –Selenium is an essential trace element that is required for the proper function of a number of crucial proteins and enzymes in the human body. Elevated levels of selenium can be toxic; however, at a supra-nutritional, but nontoxic level, the element has been linked with reduced cancer incidence in several studies. 1,4-phenylenebis(methylene) selenocyanate (p-XSC) has been shown to reduce animal tumors, and it plays a role in cell cycle control and cell proliferation. We have used *Saccharomyces cerevisiae* as a model system to better understand p-XSC's chemo-preventative properties in humans. Our initial studies determined that the highest non-toxic dose of p-XSC in yeast is 100 nanomolar, which is comparable to human cells. Yeast cells were then pre-treated with p-XSC at 100 nanomolar, and then changes in cellular viability were measured in these cells that contained oxidative DNA damage caused by an LD50 dose of hydrogen peroxide (2 mg/ml H<sub>2</sub>O<sub>2</sub>). Initial results indicate no increased viability in the p-XSC treated cells in response to H<sub>2</sub>O<sub>2</sub> suggesting no protection against oxidative damage. Studies with LD50 doses of the chemical mutagen N-nitroso-N-methyl urea (MNU) are in progress and will be presented. (155)

**Ricker, Tylor\*, Renee Poesnecker, Sean Deats, and William J. Biggers.** Department of Biology, Wilkes University, 84 W. South Street, Wilkes-Barre, PA 18766. *Regulation of Settlement and Metamorphosis of Larvae of Capitella teleta by Serotonin*. -The regulation of settlement and metamorphosis of several types of marine larvae into juveniles has been demonstrated to involve both stimulatory neurotransmitters, such as acetylcholine and serotonin, and also nitric oxide which acts as an inhibitory neurotransmitter that maintains the larval state. We have explored the involvement of serotonin in mediating settlement and metamorphosis of metatrochophore larvae of the polychaete annelid *Capitella teleta*. Previous results in our laboratory have indicated that

exogenous serotonin can induce settlement and metamorphosis of these larvae and that ketanserin, a serotonin 5-HT<sub>2</sub> receptor antagonist, inhibits the response of these larvae to both serotonin and also a natural chemical cue that induces settlement and metamorphosis. In further exploring regulation by serotonin, we now report that fluoxetine, a selective serotonin reuptake inhibitor, is able to also stimulate settlement and metamorphosis of these larvae, and that exogenous application of ketanserin also blocks the spontaneous settlement of these larvae that occurs in the absence of a natural chemical cue. (89)

**Riley, Mary\* and Bradley Rehnberg.** York College of Pennsylvania, York, PA 17405. *The influence of ambient and den temperature on the above-ground activity of woodchucks (Marmota monax) in south-central Pennsylvania* – This study assessed above-ground activity of the woodchuck (*Marmota monax*) as influenced by ambient and den temperature. A small population of woodchucks in York, Pennsylvania was observed from late June 2010 through mid-November 2010 for a total of eighteen observation days; a day was comprised of three 1-hour intervals in the morning, midday, and evening. Our goal was to quantify the number of woodchucks present and total time spent above ground. Hobo H8 4-channel loggers recorded ambient and den temperatures for four, roughly 2-week intervals from June to October. Den temperatures remained relatively constant on a daily basis throughout the four intervals, averaging 20.7 °C, 22.4 °C, 21.2 °C, and 13.8 °C respectively. During June, July, August, and early September, den temperatures were stable and averaged 9.2° below ambient between 1200 and 1600 hours. There was a notable lack of morning activity throughout the study. Woodchucks favored afternoons and evenings, even on days when ambient temperatures were over 30°C. The maximum number of observed woodchucks and longest times spent above ground

were in late September through October. Given the day-to-day consistency of den temperatures, and their stability during day and night, woodchuck activity seems to be predominantly influenced by changes in ambient temperature. (115)

**Robert, Terry\***, **Anastasya Menaker**, **Brittany Lippert**, **Rebecca Stanton**, **Bhumi Patel**, **Bethany Eiche**, **Michelle Wakeley**, **Justin Gentile**, **Mohammed Abu Riyaleh**, **Tiffany Zehner**, **Zenaida Lopez-Dee**, **Jack Lawler<sup>1</sup>** and **Linda S. Gutierrez**. Department of Biology, Wilkes University, Wilkes-Barre, PA and (1) Division of Experimental Pathology, Department of Pathology, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA. *Therapeutic effects of Thrombospondin 1 derived peptides on inflammatory bowel disease*. -Inflammatory bowel diseases (IBD), such as Crohn's disease and ulcerative colitis, are characterized by chronic inflammation and increased risk for colorectal cancer. Thrombospondin 1 (TSP-1) is a multimodular protein that inhibits cell proliferation and induces apoptosis. Peptides derived from the type 1 repeats of TSP-1 (TSR) have significant anti-tumor effects in pre-clinical models for cancer. To better examine the functions of TSR in IBD, mice (n=37) were treated with dextran sodium sulfate (DSS) for 7 days to induce colitis. A peptide containing all three TSRs (3TSR) and two peptides involving the second TSR domain: one with an activating sequence for transforming growth factor- $\beta$  1 (TGF $\beta$ 1), (TSR2 + RFK) and another without it (TSR2), were simultaneously injected. Control mice injected with saline were also included in the study. Clinical and histological analyses were conducted in order to better clarify their potential therapeutic effects. Colonic sections from mice treated with the peptides containing the activating sequence for TGF $\beta$ 1 (3TSR and TSR2 + RFK) displayed a significant decrease in inflammation. These results suggest that peptides containing the RFK sequence might be effective as anti-inflammatory agents in IBD. (157)

**Rocco, Sarah\***, **Derreck Shenk** and **Melinda Harrison** Cabrini College, Radnor, PA 19087. *Observing the Growth Rate of Chlamydomonas reinhardtii when exposed to Various Concentrations of Selenium*- Selenium is an essential trace element for the wellbeing and development of several organisms, from algae to humans. It plays a vital role in the formation of selenoproteins which function in the protective processes from oxidative stress. However, an overdose may cause selenium poisoning and result in defects for human health. The purpose of this experiment is to find the optimal levels of growth as well as the toxic levels for the algae, *Chlamydomonas reinhardtii*. This was done by exposing liquid cultures of *C. reinhardtii* to various concentrations of selenate and selenite then observing their growth rate by counting cells daily with a hemocytometer. Previous experiments of this lab revealed that the optimal level of selenate for *C. reinhardtii* was 35 $\mu$ M while the toxic level was between 50 $\mu$ M and 100 $\mu$ M. The optimal level for selenite was found to be 5 $\mu$ M for the growth of *C. reinhardtii* but was not inhibited when exposed to higher concentrations of selenite. Further investigation needs to be done to support these findings but overall this is just a step to understand the positive and negative effects of selenium on living cells. (172)

**Russell, Ashley\*** and **J. Michael Campbell**. Mercyhurst College, Erie, PA 16546. *An experimental aeroponic algae growth system for naturally occurring Lake Erie periphyton*. - Water withdrawn continuously from the marina at Presque Isle State Park in Erie, PA will be used to evaluate whether naturally occurring periphyton from Lake Erie can be grown successfully in an aeroponic algal growth system. The effects of seasonal variations in ambient temperature and biofilm development on algae biomass and succession on experimental substrates will be monitored biweekly from Winter 2011 through Fall 2012. The initial design of the experimental system and algal community composition found during the winter of 2011 will

be described. These experiments support basic research intended to inform future scale-up algae production operations that would utilize ambient Lake Erie water and local organic waste materials as feedstocks. (80)

**Sabo, Robert D.\***, and **Jeffrey A. Simmons**. Mount Saint Mary's University, Emmitsburg, MD 21727. *Exploration of the Gypsy Moth Disturbed Forest Patches on College Mountain: Determination of Disturbance's Legacy on Future Forest Diversity and Soil Fertility* – Due to the relative non-discriminatory eating habits of gypsy moth larvae, the question of whether or not this exotic pest negatively or positively affects forest ecosystems both on short and long term time scales must be explored in accordance with the Intermediate Disturbance Hypothesis. Overall the main objective of this project was to determine the effects of forest gaps (i.e., gypsy moth disturbances) on 1) composition and size of tree species, 2) diversity and abundance of herb species, and 3) soil respiration and fertility on College Mountain in central Maryland. Three replicate plots were established and a comparison was made between gypsy moth-caused forest gaps, associated edge habitats, and undisturbed forested plots. Tree diversity, understory plant diversity, soil CO<sub>2</sub> emission, carbon content, and pH were measured in each of the 15 x 15m plots. Analysis indicates that these gaps have no significant effect on soil respiration, while tree diversity and litter fall showed significant differences with the undisturbed possessing higher values ( $p = 0.02$  and  $p = 0.038$ , respectively). (48)

**Shaley, Kiel\*** and **Villemain, Jana L.** Indiana University of Pennsylvania, Indiana, Pa. 15705. *Essential Structural Characteristics of the Saccharomyces cerevisiae Srs2 Helicase C-terminal Region to Its Multifaceted Role in Mediating Homologous Recombination Events*- The results of this study provide preliminary evidence that the C-terminal region of the Srs2 helicase possesses structural features associated with intrinsically unstructured proteins (IUPs). Srs2 is homologous to other helicases, and homology modeling shows

the Srs2 N-terminal region to have the expected 3D helicase structure. However, the C-terminal 454 residues of Srs2 appear to have no structural similarity to other proteins of known structure. Following analysis of the C-terminal sequence with recently developed software tools designed to identify and characterize intrinsically unfolded or disordered proteins, it was discovered that the Srs2 C-terminus shares many features with this class of proteins. We show the results of our analysis of the Srs2 helicase C-terminus and comparison to other known IUPs. We then correlate these findings with other results reported recently referencing the structure and function of the C-terminal region of this protein. Srs2 appears to have many overlapping functions associated with the protein's C-terminus mediated via interactions with other cellular proteins even though it lacks a defined shape. In further studies using fluorescence spectroscopy, we propose to investigate possible structural changes adopted by this region of Srs2 designed to flexibly toggle its activities through protein interactions responsive to cellular status signals. (149)

**Shaw, Melissa\*** and **Jane E. Huffman**. East Stroudsburg University, East Stroudsburg, PA 18301. *Molecular characterization of Babesia in Black Bears (Ursus americanus) in New Jersey - Babesia*, a tick-borne protozoa, is the causative agent of babesiosis. Infection with *Babesia* is characterized by intraerythrocytic multiplication of apicomplexans, which can produce malaria-like symptoms. Over 100 *Babesia* species have been described in a large number of vertebrate and mammal hosts. One host in which *Babesia* has not yet been characterized is the black bear (*Ursus americanus*). For this study, blood samples were collected from adult black bears during two trapping seasons. An initial primer assessment was conducted, in which three sets of primers were used in polymerase chain reactions to detect the DNA of *Babesia* spp. This was done in order to determine which primers were best suited for this

study. Initial results show that there is a high prevalence (51%) of *Babesia* spp. in black bears in New Jersey. Ongoing sequence analysis will determine more specifically which species of *Babesia* most commonly occurs in black bears. (180)

**Shenk, Derreck\*, Sarah Rocco and Melinda Harrison.** Cabrini College, Radnor, PA 19087. *The Affects of Selenium on the Rate of Growth of Chlamydomonas reinhartii and New Storage Techniques* –The experiments performed were designed to understand how selenium reacts with the cells of different organisms. This study focused on the optimal levels of selenium growth as well as the toxic levels for the algae *C. reinhartii*. The important of this research is that selenium is an essential trace element in a variety of different organisms, including humans, but just the slightest amount over the concentration required can cause selenium toxicity in humans. The experiments were carried out by exposing liquid cultures of *C. reinhartii* to varying levels of both selenate and selenite and monitoring their growth by counting the cells daily with the help of a hemocytometer. Based on the results from this experiment, the optimal level of selenate for *C. reinhartii* was 35µM while the toxic level of the algae seemed to be somewhere between 50 µM and 100 µM. Selenite on the other hand had an optimal level of only 5µM for *C. reinhartii* to grow but was not inhibited when exposed to higher concentrations of selenite. This experiment is just a step to understanding the positive and negative effects of selenium on living cells. (21)

**Shingler, Kristin L.\* and Steven W. James.** Department of Biology, Gettysburg College, Gettysburg, PA 17325. *The Role of the snoA C-Terminus as a Mediator of Meiotic Recombination and Double Strand Break Repair in Aspergillus nidulans.* – The filamentous fungus *Aspergillus nidulans* regulates meiotic recombination and double-strand break repair through the heterodimeric *nimO<sup>Dbf4</sup>-Cdc7* kinase. Mutations in *nimO<sup>Dbf4</sup>* prevent the induction of DSBs necessary for meiotic crossing over and confer extreme sensitivity to DNA damage agents, especially to mutagens that

cause double strand breaks (DSBs). We discovered a suppressor of *nimO*, *snoA*, that is orthologous with a novel eukaryotic mediator of DNA damage responses. *snoA* mutations by themselves do not alter sensitivity to DSB mutagens. Instead, *snoA* null mutations largely rescue the profound DSB sensitivity of *nimO<sup>Dbf4</sup>* mutants. Moreover, loss of *snoA* completely restores normal fertility to sterile *nimO<sup>Dbf4</sup>* meiotic mutants. To investigate the role of *snoA* in meiotic recombination and DSB repair, we are studying a highly conserved, 43 amino acid (aa) C-terminal domain of *snoA*. By a combination of fusion PCR and gene replacement, I created two *snoA* alleles lacking 43 and 50 C-terminal aa. Preliminary genetic analysis indicates that the *snoAΔC* mutations mildly rescue the DSB sensitivity of *nimO* mutants. Experiments are underway to assess meiotic rescue of *nimO<sup>Dbf4</sup>* defects, and to measure meiotic recombination frequencies in crosses involving *snoAΔC* and *nimO<sup>Dbf4</sup>* mutants. (147)

**Shoemaker, Erin\*<sup>1</sup>, Rick Stahl<sup>2</sup>, David Carey<sup>2</sup>, and Angela Asirvatham<sup>1</sup>.** <sup>1</sup>Misericordia University, Dallas, PA 18612, <sup>2</sup>Weis Center for Research, Geisinger Clinic, Danville, PA 17822. *The Role of A-Kinase Anchoring Proteins and Akt in Schwann Cell Cultures.* The development of the peripheral nervous system is dependent upon the interaction between Schwann cells and neurons. Division of Schwann cells is promoted by the heregulin/neuregulin family of growth factors secreted by neurons. The proliferation of Schwann cells in heregulin stimulated cells is not induced unless signaling pathways dependent on cyclic adenosine monophosphate (cAMP), the universal signaling molecule are also activated. The molecular mechanism mediating this response is not understood. In eukaryotic cells, the diverse effects of cAMP are mediated through protein kinase A (PKA), which is localized to specific subcellular sites by a family of scaffolding proteins known as A-Kinase anchoring proteins. To investigate the mechanism by which heregulin and forskolin (an activator of cAMP), stimulate Schwann cell growth, we hypothesized that AKAPs are involved. Using sequence spe-

cific AKAP-SiRNA (small interfering RNA) we showed that AKAP150 is required for Schwann cell proliferation. Immunoblot analysis of cells transfected with AKAP-SiRNA revealed a reduced expression of AKAP150, and Akt (also known as Protein kinase B). Akt is a serine/threonine kinase that promotes cell survival. Preliminary data suggests that AKAP150 and Protein Kinase B may function as substrates in the synergistic response of Schwann cells to treatment with heregulin and forskolin. (27)

**Simmons, Jeffrey A.\*** Mount St. Mary's University, Emmitsburg, MD 21727. *Nutrient Removal Ability of a Stream Receiving Wastewater Effluent* – Although most nutrient management programs focus on nutrient sources, most stream channels have the capacity for substantial nutrient processing. Furthermore, for TMDL models it is important to know how in-stream processes can alter nutrient concentrations. The objective of this study was to determine the capacity of a stream, which is receiving WWTP effluent, to remove nitrogen and phosphorus. Stream water was collected at 6 points along the length of St. Mary's Run on several dates. Stream water was analyzed for dissolved reactive and total phosphorus (DRP and TP, respectively), ammonium, nitrate, and sulfate. The WWTP discharge dramatically increased nutrient concentrations just downstream. From there TP concentrations generally decreased to the mouth of the stream but did not reach pre-effluent levels indicating that the stream has some capacity to remove P. Ammonium-N concentrations also decreased steadily with distance from the WWTP while nitrate-N concentrations increased, suggesting rapid conversion of ammonium into nitrate. Inorganic-N remained elevated across the entire length of the stream suggesting that the stream was saturated with N. Estimates of P and N removal per unit length of stream channel ( $0.35$  to  $0.75$  g P  $m^{-1} d^{-1}$  and  $-0.03$  to  $4.45$  g N  $m^{-1} d^{-1}$ ) varied with season. (98)

**Simpler, Elizabeth M.\*<sup>1</sup>, Jonathan M. G. Perry<sup>2</sup>, and Adam Hartstone-Rose<sup>3</sup>.** <sup>1</sup>Department of Anthropology, Penn State University, 409 Carpenter Building University Park, PA 16802. <sup>2</sup>Department of Anatomy, Midwestern University, 555 31<sup>st</sup> St., Downers Grove, IL, 60515. <sup>3</sup>Department of Biology, Penn State Altoona, 3000 Ivyside Park, Altoona, PA, 16601. *Dietary Correlates of Carnivorous Masticatory Muscle Architecture*. Most members of the order Carnivora consume vertebrate flesh, though many consume as their primary diet other foods such as invertebrates and/or plant material and indeed some carnivores are nearly entirely herbivorous. In this study we explore the dietary adaptations of the masticatory muscles. Specifically, we examine how the mass, fascicle length (FL) and physiological cross-sectional area (PCSA) of the masticatory muscles of a large sample of carnivores scale isometrically with body mass. We also examine the effects of diet on these scaling patterns. We found that muscle mass and PCSA scale differently between felids, canids and ursids, and FL varies according to the subtle dietary variation within the families. Specifically, carnivores whose diet consists of large prey have relatively longer fascicles (an adaptation for increased gape), while carnivores whose diets consist of more obdurate (harder or tougher foods) have relatively shorter fascicles and therefore higher PCSA (an adaptation for increased force production), and that taxa that consume both large and obdurate foods (like the relatively large vertebrate-consuming spotted hyena, *Crocuta*, and wolverine, *Gulo*) have both relatively long fibers (to accommodate the large food size) and massive muscles (the only way to increase the PCSA without sacrificing gape abilities). (70)

**Simpson, Aiden\*, and Andrew C. Keth.** Clarion University of Pennsylvania, Clarion, PA 16214. *The Effect of Coarse Woody Debris Load on Abundance & Diversity of Benthic Macroinvertebrate Communities in Head Water Streams*. – Any sizeable down, dead wood can be described as coarse woody debris. Coarse woody debris plays a major role in the formation of aquatic habitat in forested

stream & riparian zones. As it increases, it alters stream structure and morphology by creating debris dams, which in turn form side pools and channels which provide habitat for macroinvertebrate communities. In this study, the total load of coarse woody debris was measured at five sampling sites in the stream systems of Blyson Run and Pendleton Run, near Fisher, PA. These data were then compared against macroinvertebrate kicknet samples taken from both riffle & pool habitat. Abundance & Diversity were then calculated for comparison between sites, habitat type, and by location in watershed. (93)

**Skokotas, Aikaterini, Tetyana Churyi, Ameema Hashmi, Hizamar Ponce\*, Winifred Wolfe\*, and Edward Winter.** Rosemont College, Rosemont, PA 19010 and Thomas Jefferson University, Philadelphia, PA 19107. *Assessing the role of Hst1 sirtuin in meiotic development in S. cerevisiae* - In *S. cerevisiae*, meiosis is regulated by a tightly controlled induction of early, middle, and late sporulation genes. The induction of middle gene expression is the key step that controls exit from prophase and meiotic commitment. Middle sporulation genes are repressed during vegetative growth by Sum1. Sum1 is a DNA-binding protein that specifically recognizes a subset of middle gene promoters and recruits an NAD<sup>+</sup>-dependent histone deacetylase (Sir2, sirtuin paralog) named Hst1, through a tethering factor, named Rfm1. Sir2 is required for chromatin-dependent silencing in yeast. Sum1 and Hst1 function in the promoter specific repression of NDT80, a transcriptional factor that controls commitment to meiotic development. During meiosis, Sum1 is down-regulated by cyclin-dependent kinase (Cdk1) and a meiosis-specific CDK-like kinase, Ime2. A Sum1 mutant (Sum1ci) insensitive to both Ime2 and Cdk1 blocks meiotic development. Furthermore, deletion of Hst1 or Rfm1 bypasses this *sum1ci* block. In this study, we present results of experiments designed to test whether pharmacological inhibition of Hst1 can bypass the block

to meiosis seen in the *sum1-ci* strain. These data will address the hypothesis that Hst1 is a meiotic gatekeeper that prevents meiosis by maintaining NDT80 chromatin in a transcriptionally inactive state. (154)

**Smith, Lori A.\* and Mel Zimmerman,** Lycoming College, Williamsport, PA 17701. *Microhabitat Selection of Brook Trout (*Salvelinus fontinalis*) and Brown Trout (*Salmo trutta*) in Two Sympatric Populations in Pennsylvania* – The purpose of this study was to determine the microhabitat selection of both Brook Trout in Brown Trout, in two sympatric populations, populations containing both species. Snorkeling surveys on Ogdoinia Creek and Big Bear Creek, both third order tributaries to Loyalsock Creek, were conducted to determine if habitat selection differs between the opposing species of trout. T-tests of independence were used for comparative analysis of means within the parameters of depth, mean velocity, distance to cover, and focal velocity. Focal velocity is defined as the water velocity at the fish's eye. Results from this study displayed with 95% confidence that trout preference along all parameters assessed were not significantly different, concluding that habitat selection between species did not differ. In addition, data that is part of a continuing 10 year monitoring project on a stream habitat restoration project in Central Pennsylvania was collected. Physical, chemical and biological parameters were assessed. Physical and chemical data included habitat assessments and water chemistry, respectively. Biological data included both fish and benthic macroinvertebrates. A comparative assessment of current conditions to historical conditions was conducted. (58)

**Sposato, Laura K.\*, and Ronald M. Supkowski.** King's College, Wilkes-Barre, PA 18711. *Quantification of Active Hydroxyl Sites on Porous Silica Particles.* The reaction between tri-ethyl aluminum (TEAl) and active hydroxyl sites on porous silica particles—the first step in the synthesis of the Ziegler-Natta catalyst—is a crucial step in the industrial production of polyolefins;

thus, the quantification of these active sites can be especially beneficial. Common methods used to do this are arduous, small-scale, and time-consuming. To address these problems, a new method was developed that utilizes a thermometric titration of TEAL and porous silica particles suspended in heptanes. The exothermic nature of this reaction allows us to determine how many active sites are available to react with the TEAL. The thermometric titration was successful within error in reproducing literature values and results obtained in-house using the common method. The thermometric titration method has the added benefits of reducing the laborious nature of previous methods because it was engineered to work outside of a glove box and it allows for the elimination of any possible effects from physisorbed water. Current projects incorporate the same robust titration to standardize the TEAL. (17)

**Surmacz, Cynthia\*, Angela Hess\*, John Hranitz, Clay Corbin, Gary Wassmer, Zareen Amin, Carl Hansen, Karl Henry, Barry Nolt, Steven Rier, Margaret Till, Jennifer Venditti, and Marianna Wood.** Bloomsburg University; Bloomsburg, PA 17815. *Extending Learning Beyond the Classroom: Creating a Biology Learning Community in a Residence Hall* – Bloomsburg University has created an Academic Biology Learning Environment (ABLE) in a campus residence hall for students enrolled in introductory classes in biology or anatomy and physiology. ABLE's mission is to strengthen the academic community in these critical beginning biology classes, to improve students' classroom performance, and, ultimately, to increase student retention. Participating students are majors in biology, pre-medicine, allied health programs (pre-physical therapy, pre-physician assistant, pre-occupational therapy, and pre-pharmacy), nursing, medical imaging, and exercise science. ABLE is housed in a residence hall where many of these students live as part of the university's Science and Health Science Living-Learning Community. ABLE provides a multi-pronged approach that includes a resource center with lab resources, manipulatives, models, posters,

and microscopes; a small library with books, workbooks, and atlases; computers with relevant software; peer-tutoring; office hours by biology faculty members; faculty-led review sessions and workshops; opportunities for individual and group study; invited speakers and seminars, and career information workshops. ABLE was accessed by over 1,000 student visitors in its inaugural year. Assessment data showed that students found that ABLE was helpful, provided useful resources, and offered a good location to study. Students and faculty overwhelmingly support its continuation. (51)

**Sween, Kayla R.\* and Dr. Audrey J. Ettinger.** Department of Biological Sciences, Cedar Crest College, Allentown, PA 18104. *Are Only Aggressive Male *Rocio octofasciata* Sexually Mature?* – Aggressive behavior in animals can serve as a model for understanding the mechanisms underlying human behavior. We are using the Jack Dempsey Cichlid fish, *Rocio octofasciata*, to study the relationship between sex and aggression. In previous work, we have demonstrated that individual *Rocio* can be classified into territorial (T) and non-territorial (NT) behavioral morphs, where T animals show a much higher rate of aggression. Interestingly, males and females are each capable of aggressive behavior. Previous studies performed in other cichlid species have found that territorial males have spermiated testes, while non-territorial male testes lack sperm. At the macroscopic level, we observed that T males are larger and have a larger gonadosomatic index. Here, we have used Hematoxylin and Eosin staining of T and NT male testis to microscopically observe variation in structure and concentration of sperm. When ovaries were isolated, T females were found to have mature eggs, while NT females have few to no mature eggs present. Because sex in these fish is difficult to determine by external morphology, future studies include developing a molecular technique for determining the sex of living animals to guide further study of the relationship between sex and aggressive behaviors. (91)

**Swimley, Thomas,\* Merlin Benner, Brian Benner, and Cody Felton.** Wildlife Specialists, LLC, 2785 Hills Creek Road, Wellsboro, PA 16901. *Remote Sensing of Potential Allegheny Woodrat Habitat and Presence in Pennsylvania*—We used a combination of aerial surveys and high altitude aerial photography coupled with LIDAR (2-ft contours) to map potential Allegheny woodrat (*Neotoma magister*) habitat as a means of providing avoidance polygons to natural gas clients. In addition, we used remote cameras at potential habitat to determine presence of woodrats as a possible alternative to live trapping, providing a more cost-effective and less labor-intensive survey method. Aerial surveys in conjunction with analysis of LIDAR contours show potential as a means of accurately mapping woodrat habitats and providing appropriate avoidance polygons. The resulting maps and GIS layer are useful as a preliminary step in project planning for seismic surveys and pipeline, access road or well pad placement. Remote cameras successfully documented presence of woodrats within one night at 3 camera locations at 2 known occupied habitat sites and provided several weeks of continuous surveillance with minimal labor. **(112)**

**Syed\*, Bakhtair and Bruce B Smith,** York College of Pennsylvania, York, PA 17403. *Descriptions and measurements of early Ovule Development through Megagametogenesis in Ranunculus repens L.-Ranunculaceae.*—This paper employed both descriptive and quantitative methods to study the early ovule development from megaspore mother cell (MMC) through 8-nuceate stage of the megagametophyte of the Creeping Buttercup; *Ranunculus repens* L. Flowers were collected beside a wetland brook on the York College Campus, fixed in FPA<sub>50</sub>, dehydrated to 100% ethyl alcohol and cleared in Herr Fluid. *R.repens* is multi-pistillate, with a single ovule in each pistil. The nucellus is tenuinucellate having a MMC with the largest nucleolus of any other nucellar cell. The MMC meiotically form a linear tetrad. The chalazal cell within the tetrad survives and forms a mature megagametophyte with eight nuclei. Measurements of each of the megasporogenesis through megagametogenesis

stages reveals that the nucellus increases through the meiotic stages, retracts when the functional spore is formed, and then expands again through the mitotic stages. Measurements of the lengths and widths, as well as descriptions and photographs from the MMC to the mature 8-nucleate megagametophyte are given. This study affirms the archaic nature of the Ranunculaceae within the early Eudicots. **(132)**

**Teresa A. Trego<sup>1,2\*</sup>, Tatyana Livshultz<sup>1</sup>, Ann F. Rhoads<sup>2</sup>, Tim A. Block<sup>2</sup>** The Academy of Natural Sciences, Philadelphia, PA 19103<sup>1</sup>; The Morris Arboretum of the University of Pennsylvania, Philadelphia, PA 19118<sup>2</sup>. *Tracking trends in pollination rates over time using herbarium specimens of Asclepias syriaca (common milkweed)* - The decline of pollinators and its potential effect on pollination service is a growing concern, but to date no study has linked pollinator decline to decline in pollination rates due to lack of data on pollination trends over time. *Asclepias* (milkweed) species require insect pollinators, and their pollen is packaged into pollinia whose removal and deposition can be readily observed in the flowers of herbarium specimens. We investigated if there was a decline in pollination rates over time in *Asclepias syriaca* (common milkweed) by scoring the removal and deposition of pollinia for 20 flowers from each of 10 historical herbarium specimens (collected 1850-1960) and 10 recent specimens (collected in 2009) from five counties in southeastern Pennsylvania. The mean rates of pollinia removal ( $0.54 \pm 0.09$  SE versus  $0.33 \pm 0.08$  SE pollinia pairs per guiderail per flower) and deposition ( $0.55 \pm 0.14$  SE versus  $0.29 \pm 0.07$  SE pollinia per guiderail per flower) are higher in recent than in historical specimens, but these differences are not statistically significant based on 2-tailed Mann-Whitney U tests. We are expanding the dataset from 20 to 60 specimens, which will provide more statistical power. **(46)**

**Teygart, Ellen L.\* and J. Michael Campbell.** Mercyhurst College, Erie, PA 16546. *Evaluating the utility of periphyton as water quality indicators in the Mill Creek watershed, Erie, PA* – Samples of periphyton were obtained during the Winter

of 2011 from several locations on Mill Creek, a tributary of Lake Erie, to evaluate the feasibility of using algae as biological indicators of water quality. Pollution indices based upon the periphyton communities at individual sites will be compared to previous biological indices using benthic macroinvertebrates. Basic water quality tests will also be used to characterize the sites. Sites within urbanized portions of the watershed are expected to produce periphyton communities indicative of degraded stream condition. **(81)**

**Thorp, Nancy A\*, Elizabeth L. Fulton, Michael D. Bilger, and Jack R. Holt.** Department of Biology, Susquehanna University, Selinsgrove, PA 17870. *A Study of Defined Habitats to Explore Relationships Between Vegetation Coverage & Periphyton within Lower Penns Creek (Synder County, PA).* - We defined habitats that contain periphyton and aquatic vegetation communities in a 180 meter reach section of Penns Creek in Selinsgrove, Pennsylvania, the communities according to the influence of discharge (depth and water velocity). We identified a mosaic of twelve discrete sample sites from six transects at 30 meter intervals according to a combination of depth (<10cm to >1m) and the local average velocity (0 to >0.5 m/s). The depth was divided into shallow and deep (<20cm to >40cm) and the velocity into slow and fast (<0.2 to >0.5 meters/second). At each location the percent coverage by aquatic vegetation (e.g. *Cladophora*, *Elodea*, *Potamogeton* and *Vallisneria*) was estimated. Percent coverage varied according to depth (shallow-slow 76.3% and shallow-fast 20.8%). Deep habitats had lower percentages (deep-slow 14.2% and deep-fast 11.4%). Relationships between the site characteristics and periphyton community structure also will be presented. Our data were collected from September to November of 2010 following the drought summer of 2010, and our results reflect the dynamic nature of streams like Penns Creek. **(82)**

**Trengue, Shelby\*, Chelsea Manes and Jeramia Ory.** King's College, Wilkes-Barre, PA 18711. *Role of the Copper Sensing Transcription Factor Cuf1p on Macrophage Phagocytosis and Killing by Cryptococcus neoformans.* - *Cryptococcus neoformans* is an opportunistic fungal pathogen with many factors that attribute to its virulence, including melanin production, capsule, and growth rate. Wild type strains of *C. neoformans* have been previously shown to be phagocytized by and kill macrophages as part of the infection process. The copper sensing transcription factor Cuf1p is responsible for copper homeostasis in the cell and is required for both melanin production and virulence. Previous studies have shown that a *cuf1* strain of *C. neoformans* is avirulent in a murine model, however the cellular mechanism by which this lack of virulence occurs has not been explored. Using J774 cells, a macrophage-like murine cell line, we will compare macrophage killing and phagocytosis of a wild type strain of *C. neoformans* with a previously constructed *cuf1* strain. **(162)**

**Trinh, Hoa\*, Kishore K. Bagga, Kevin Owens.** Drexel University College of Medicine, Philadelphia, PA 19102. *Dibutyl Phthalate and Other Pesticide Residues from Various Tropical Fruits* - Due to the potential health hazards of pesticides, the current investigation was performed. The work here reported involved the detection, identification using GC/MS, and comparison of the presence of pesticides in the peel and the pulp of some tropical fruits. Data from this work has shown the presence of dibutyl phthalate (pesticide) in most of the fruits tested, and that green mango had the largest number of pesticide residues present; whilst in the case of guava no pesticides were detected. Furthermore, there was a larger pesticide residue content in the peel versus the pulp of the fruits tested. **(23)**

**Troyer, Rachael\*, and Andrew Turner.** Clarion University, Clarion, PA 16214 *Chemosensory Impairment of Grey Tree Frog Tadpoles in Sewer Effluent* - The acquisition of sensory information by animals is central to species interactions. Most aquatic organisms use chemical cues to assess pre-

dation risk and other key ecological factors. A few studies suggest that anthropogenic pollutants can disrupt chemoreception, even when at low, non-toxic concentrations. Our research tested whether the chemosensory ability of the grey treefrog, *Hyla versicolor*, was impaired when tadpoles were exposed to sewer effluent. Employing a factorial approach, we manipulated predation risk and water quality experienced by tadpoles housed in laboratory aquaria. Predation risk was manipulated by adding predator cues or control cues. Water quality was manipulated by housing tadpoles in three types of water: sewer effluent, stream water, and de-chlorinated tap water. Tadpoles housed in tap water and stream water responded to predator cues by reducing activity by 63% and 49% respectively. Tadpoles housed in sewer effluent reduced activity by just 17%, and ANOVA showed that the response to predator cues depended on water type ( $P = .02$ ). Thus, sub-lethal concentrations of dissolved compounds in wastewater can impair predator avoidance behavior. Because most aquatic species rely on chemoreception to gather information on the location of food and predators, the impairment of sensory perception likely has important ecological consequences. (86)

**Tucker, Cynthia A.\*, William S. Humbert\*, Amanda M. Ritz, Lauren E. Kessler\*, and Theo Light.** Shippensburg University, Shippensburg, PA 17257. *Land-use effects on South Central Pennsylvania streams: a comparison of fish health and fish biotic indices* - Land-use effects on freshwater stream ecology have received increasing attention in recent years. Interest has been focused on the negative impacts of urbanization and agriculture. Fish assemblages in the Conodoguinet, Yellow Breeches, and Conococheague drainages were sampled by electrofishing in forested, urban, and agricultural sites during the fall of 2010 to compare impacts of land-use within and between drainages. Three fish-based indices of biological integrity were calculated for each site to examine effects of land-use on fish communities and compare sensitivity of the indices. We also carried out a fish health assessment and compared its results to the

biotic indices. Though not all health parameters could be assessed in all sites because of variable species composition, fish health indices indicated significant land use effects. Overall analysis of these indices indicated that agriculture-dominated sites had the worst outcomes for both fish health and community integrity. (83)

**Tyler, Melissa\*, and Thomas C. LaDuke.** East Stroudsburg University, East Stroudsburg, PA 18301. *Recent investigations of the fossils of Hartman Cave, Monroe County, PA: Newly recovered mammalian fossils.* East Stroudsburg University, East Stroudsburg, PA 18301. A large collection of vertebrate fossils was recovered from Hartman Cave in Monroe County during the late 1800s. The last paper detailing this fossil fauna was published in 1889. In 2007, substrate samples were collected from Hartman Cave in order to search for possible microfossils. A small amount of material from the cave floor has yielded an extensive collection of microfossils including mammals, birds, reptiles, amphibians, and fish as well as arthropods, mollusks and seeds. This report describes the mammalian remains that were identified from among these microfossils. Several species of mammals not previously reported from the Hartman Cave fauna are included. Radiocarbon Dates of specimens from Hartman cave have determined that the fossils range in age from approximately 4,101 to 10,600 years old. (121)

**Umstead, Weston\* and Francis C. Mayville.** DeSales University, Center Valley, PA 18034. *The Synthesis of Four Spermidine Analogs as Potential Anticancer Agents* - We synthesized several ionic liquids containing the 1-hexyl-3-methyl-imidazolium cation coupled to various anion systems. These ionic liquids along with ethanol were used in the substitution reactions of spermidine to produce (Bis) Ethyl, (Bis) Propyl, (Bis) Propionyl and (Bis) Acetyl Spermidine. Polyamines, in general, have been demonstrated to have potential effects on cell proliferation. Using "green" solvents, we were able to produce four-fold higher yields of each agent with exceptionally high purity. Following

each synthesis, the spermidine analog products were characterized to evaluate purity and to confirm chemical identity. Following evaluation of each of the four analogs for potential anticancer activity, one was selected, (Bis) Propyl Spermidine for detailed examination of its effect on growth kinetics of human cancer cells. These data will be presented in a separate study. (16)

**Wademan, Meagan\***, and **Hannah Tims**. Messiah College, Grantham, PA 17027. *Utilizing Fluorescence Resonance Energy Transfer (FRET) to Study Exchange Rates in Class II ZmHsp 17.0 Oligomeric Subunits in the Presence of Heat Denatured Citrate Synthase*. – Small heat shock proteins (sHsps) are molecular chaperones that bind to denaturing proteins during cellular stress in order to prevent protein aggregation. sHsps are the most diverse in plants which contain six different classes based on cellular localization. Two of these categories are cytosolic class I and II sHsps. Although much is known about class I, very little is known about class II sHsps. It has been found that sHsps form dynamic oligomers ranging from 12-24 subunits, yet the oligomer association/disassociation mechanism is not fully understood. We attempted to label each subunit with either one of two chromophores in order to measure the dynamic exchange rates of interacting labeled and unlabeled sHsp oligomer structures with fluorescence resonance energy transfer (FRET). This study specifically attempted to measure the oligomer exchange rates of class II ZmHsp17.0 in maize, in the presence of heat-denatured citrate synthase (CS) with FRET. (144)

**Weber, Andrew\***, **Margaret Brittingham** and **Andrew Wilson**, School of Forest Resources, Pennsylvania State University, University Park, Pennsylvania, 16802. *Habitat Use by Grassland Obligate Birds in South Central Pennsylvania* – In Pennsylvania, many grassland bird species have declined 80% or more since the mid-1960's potentially resulting from changes in agricultural practices. The Conservation Reserve Enhancement Program (CREP), a farmland conversion program, could provide valuable habitat for these declining

species. We conducted point counts to compare use of CREP fields by grassland birds in relation to the availability of CREP on the landscape. Grasshopper Sparrows *Ammodramus savannarum* and Indigo Buntings *Passerina cyanea* were found less frequently on CREP fields than expected based on availability of CREP. Field Sparrows *Spizella pusilla* and Song Sparrows *Melospiza melodia* were found somewhat more frequently on CREP fields while some birds including Eastern Meadowlark *Sturnella magna* and Red-winged Blackbird *Agelaius phoeniceus* were found more frequently on CREP fields than expected. The abundances of species found more frequently on CREP fields were also positively correlated with amount of agricultural fields enrolled in CREP. These findings suggest that some grassland obligate bird species are benefiting from the conversion of less productive agricultural land into grasslands while other species are not utilizing these grasslands. (41)

**Weber, Nathan\***, **Emily Carothers**, **Alicia Helfrick**, and **Heather Sahli**. Shippensburg University, Shippensburg, PA 17257. *The impact of timber harvest on the pollinating insect communities in south central Pennsylvania* -Timber harvest is a regular disturbance in many of Pennsylvania's forests. While many studies have documented the effect timber harvest has on plant communities, little research has examined how timber harvest impacts insect communities. Flower visiting insects play a vital role in plant reproduction for the vast majority of flowering plant species, and insect pollinators are facing a decline worldwide. Thus, it is important to understand how such regular disturbances as timber harvest may affect pollinating insects in Pennsylvania. Furthermore, there have been few studies documenting the richness and abundance of insect pollinators in Pennsylvania's forests. In this study we compared the insect community in three sites that had been logged in the past 15-20 years and three sites that have not been logged for over 100 years, focusing particularly on flower-visiting insects. Insects were collected as they visited

flowers in each site, and time spent sampling was standardized across all sites. In addition, pan traps were used to quantify richness and abundance of insects at all sites throughout the study period. (128)

**Welsh, Kelly\*** and **Wendy Boehmler.** York College of Pennsylvania, York, PA 17405. *The Identification and Expression of Synapsin IIa in Zebrafish* - The synapsin genes (synapsin I, II, and III) encode neuronal phosphoproteins that play an important role in neurotransmitter release by transferring the synaptic vesicle to the plasma membrane on the presynaptic terminal. Recently, it has been reported that synapsin II expression levels are decreased in post-mortem brain samples of schizophrenic patients. There is a need to investigate the molecular mechanisms underlying these changes in expression of synapsin II. Zebrafish are becoming increasingly used as an important vertebrate model for human disease. This study aims to identify and clone the isoform synapsin IIa in zebrafish. We mined the zebrafish EST database and identified a novel zebrafish synapsin IIa homolog. Using a reverse transcriptase polymerase chain reaction (RT-PCR) strategy, we generated a 1420 base pair cDNA encoding the entire gene. We used the same RT-PCR approach in order to reveal robust expression in zebrafish embryos and in adult zebrafish brain and eye tissues. The methods of *in situ* hybridization combined with the power of zebrafish genetics should reveal how synapsin II is regulated. (143)

**Wendt, Frank R.\*, Eric J. Malmberg, Corien Bakermans, Susanne Douglas.** Altoona College, Pennsylvania State University, Altoona, PA 16601 and the NASA Jet Propulsion Laboratory, Pasadena, CA. *Diversity of 16S rRNA Genes of Uncultured Microorganisms from Antarctic Permafrost* - The harsh dry and cold (mean annual temperatures of -15 to -30°C) conditions of the Antarctic Dry Valleys (ADV) have long been believed to be inhibitory to metabolic activity of microorganisms. Recent discoveries have suggested otherwise and demonstrated that microorganisms are active and

actually thrive in permafrost (permanently frozen) soils. We examined the identity and diversity of microorganisms present in ADV permafrost soils by extracting bulk community DNA from Taylor Valley (TV) soils, which are wetter and warmer, and University Valley (UV) soils, which are drier and colder. DNA could not be extracted from UV soils but there were significant amounts of DNA in TV soils. A clone library was constructed of 16S rRNA genes that were PCR amplified from extracted DNA. The TV clone library was dominated by *Acidobacteria* (48% of clones) and *Gemmatimonas* (28% of clones) species which are common to cold and soil-covered environments. Not surprisingly, the diversity of microorganisms present in TV permafrost appears to be limited, likely due to the pervasive low temperatures. Furthermore, considering that DNA was only obtained from TV permafrost soils, the relatively warmer and wetter conditions of TV are likely more conducive to microbial growth and survival in Antarctica. (176)

**Williams, Stefanie\*** and **Carolyn F. Mathur.** York College of PA, York, PA 17403. *Pathogenic Bacteria on Non-clinical Cell Phones* - Cell phones used in clinical settings have been reported to harbor pathogenic bacteria. The objective of this study was to determine if pathogenic bacteria were present on cell phones used in non-clinical settings. Seven cell phones were tested and 31 isolates identified using standard morphological and biochemical tests. Isolates included both Gram positive [*Staphylococcus* (St) and *Bacillus* (B) species] and Gram negative [*Klebsiella* (K) and *Shigella* (Sh) species] bacteria. Capsules were detected in St, K and Sh. Some St and Sh hemolysed sheep red blood cells (srbc), and some St, K and Sh could agglutinate srbs. Most St (80.0%) were coagulase +, while 40.0% produced  $\beta$ -lactamase. St, K, and Sh, were resistant to vancomycin. Some isolates were also resistant to novobiocin (30.8%), erythromycin (15.4%) and/or streptomycin (7.7%). Overall, 46.2% had some antibiotic resistance. The microbial profile of the populations isolated from each phone varied depending on the owner, indicating

that the microbes present on the phone were highly dependent on the activities of the individual, as might be expected. The results of the study demonstrate that cell phones from nonclinical settings can harbor potentially virulent pathogens. **(167)**

**Wolf, Leann\* and Carolyn F. Mathur.** York College of PA, York, PA 17403. *A Comparison of Canine Parvovirus Infections at Two Pennsylvania Animal Shelters* - Canine parvovirus disease has a 91% mortality rate in untreated or unvaccinated dogs. The vaccine is very effective, but poorly-protected dogs in animal shelters can be particularly susceptible to this fast-spreading, devastating infection. Some shelters have had to quarantine their dogs when parvovirus is detected. However, information on the prevalence of the disease, on both a state and national level, is not readily available. The objectives of this study were 1) to compare the prevalence of canine parvovirus at two Pennsylvania animal shelters, and 2) to determine if breed, season and location correlate with the disease prevalence. Data from 2006 to 2009 were analyzed from two animal shelters in the Lancaster and Reading areas. The Reading shelter had higher incidence of parvovirus infections compared to Lancaster for each year using a Chi-square analyses [ $p= 0.0032(2006): 0.0001(2007): 0.001(2008): 0.008(2009)$ ]. The Reading shelter is in an urban, lower-income location, compared to the rural Lancaster location. Most cases occurred in summer months, and the most commonly-infected breed was the pit bull. Better understanding of the factors that influence the occurrence of canine parvovirus can help decrease the prevalence of this viral infection. **(179)**

**Wolfe, Courtney\* and Keler, Cynthia.** Delaware Valley College, Doylestown, PA 18901. *Effect and Efficiency of the Plant-Growth Promoting Bacteria, *Fraturia aurantia*, in Improving Market Crops Maturity Rate-* The potential to grow mature market crops in a more brief time frame is a goal that nearly every farmer shares. *Fraturia aurantia* is a known plant-growth promoting bacteria (PGPB). According to a personal study, the inoculation of

soy beans seeds with this PGPB before germination resulted in a significant improvement in initial root length of 130 % over a control group. Upon observing both test and control seeds after potting, it was noted that the test group showed an increased rate of growth consistent with the initial growth percentage measured after germination. In this study the inoculation of various seed types with the PGPB, *Fraturia aurantia*, and the effect on plant growth will be determined. Providing a natural plant enhancer containing the potential to decrease the time span between crop germination and market could offer new opportunities, as well as higher economic benefit, to the farmers of our nation. **(135)**