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89th Annual Meeting
of the
Pennsylvania Academy of Science

April 5 – 7, 2013

University of Pittsburgh, Bradford

Bradford, PA

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SCHEDULE OF ACTIVITIES AT A GLANCE

89th Annual Meeting of the Pennsylvania Academy of Science

April 5th-7th, 2013
University of Pittsburgh-Bradford • Bradford, PA

Friday, April 5th

3:00pm-5:00pm	Field Trips	
5:00pm-7:00pm	PAS Board Meeting and Dinner	Commons 218
7:00pm-9:00pm	Social Mixer	University Room

Saturday, April 6th

8:30am-3:10pm	Marcellus & Utica Shale Gas Symposium	Blaisdell 138
8:30am-10:00am	Oral Presentations	
	I. Plant and Pollinator Biology	Fisher 107
	II. Cell Cycle and Cancer Biology	Swarts 162
	III. Metabolism and Stress Responses	Swarts 111
10:00am-10:15am	Break	
10:00am-11:30am	Poster Session I: Ecology	Old Field House (Sports and Fitness Center)
10:15am-11:30am	Oral Presentations	
	IV. Water Quality	Fisher 107
	V. Applications of Molecular Biology	Swarts 162
11:30am-1:15pm	Lunch	Dining Hall

1:30pm-3:00pm	Poster Session II :Plants, Mathematics, GIS, and Microbiology	Old Field House (Sports and Fitness Center)
1:30pm-3:00pm	Oral Presentations	
	VI. Aquatic Biology	Fisher 107
	VII. Wildlife Ecology	Swarts 162
	VIII. Genetics & Proteomics	Swarts 111
2:00pm-2:15pm	Break	
3:15pm-5:45pm	Field Trip	
6:00pm-9:00pm	Dinner and Keynote: Marcellus Shale Development in Pennsylvania	Arena

<i>Sunday, April 7th</i>

8:00am-9:00am	Board Meeting	
9:00am-10:30am	Oral Presentations	
	IX. Animal Ecology and Physiology	Fisher 107
	X. Environmental Molecular Biology	Swarts 162
	XI. Immunology	Swarts 111
10:30am-10:45am	Break	
10:30am-12:00pm	Poster Session III: Cell and Molecular Biology	Old Field House (Sports and Fitness Center)
10:45am-12:15pm	Oral Presentations	
	XII. Aquatic Biology and Systems Monitoring	Fisher 107
	XIII. Geography/GIS	Swarts 162
	XIV. Education	Swarts 111
12:00pm-1:00pm	Lunch and Awards Ceremony	Dining Hall/University Room

PROGRAM SESSIONS

89th Annual Meeting of the Pennsylvania Academy of Science
University of Pittsburgh-Bradford, Bradford, PA

April 5 – April 7, 2013

Program Chairs
Alyssa Bumbaugh and Heather Sahli

† Indicates participation in student competition

ORAL SESSION I

SATURDAY, APRIL 6

8:30 – 10:00am

PLANT AND POLLINATOR BIOLOGY

Fisher 107

J. Michael Campbell, Session Chair

8:30am – 8:45am

1. †*Effect of pH on Photosynthesis in the Aquatic Plant Duckweed (*Lemna* spp.).* **Miller, Joseph***, **Maria LoBrutto**, and **Cosima Wiese**. Misericordia University, Dallas, PA. 18612.

8:45am – 9:00am

2. †*Does the Enemy Release Hypothesis Explain the Success of Invasive Species in Pennsylvania?* **Williams, Varma-Rose*** and **Heather Sahli**. Shippensburg University, Shippensburg, PA 17257.

9:00am – 9:15am

3. *Plant Community Development on a Stone Wall by a Tidal River of Southern Ireland.* **Campbell, J.M.*** Mercyhurst University, Erie, PA, 16546.

9:15am – 9:30am

4. *A Similarity Comparison of Extant Vegetation to the Soil Seed Bank in the Natural Lands Section of the Morris Arboretum.* **Williams, Emma***. The Morris Arboretum of the University of Pennsylvania, Philadelphia, PA 19118.

9:30am – 9:45am

5. *A Survey of Wild Bees (Hymenoptera: *Apoidea*) in Philadelphia, Pennsylvania.* **Wilson, Stephanie***. The Morris Arboretum of the University of Pennsylvania, Philadelphia, PA 19118.

9:45am – 10:00am

6. *Antheridiogen and Abscissic Acid Influence Conversion and ANI1 Expression in the Homosporous Fern *Ceratopteris richardii*.* **Ganger, Mike***, **Hannah Smith**, **Julia Girouard**, **Beth Bahny**, and **Sarah Ewing**. Gannon University, Erie, PA 16541.

ORAL SESSION II

SATURDAY, APRIL 6

8:30 – 10:00am

CELL CYCLE AND CANCER BIOLOGY

Swarts 162

Steven James, Session Chair

8:30am – 8:45am

7. *Expression of the Human Gastrin Receptors CCK-BR and CCKCR in PANCO2 Murine Pancreatic Cancer Cells.* **Sell, Shannon V.^{1*}**, **Glenn R. Jones¹**, **Gail L. Matters²**, and **John F. Harms¹**. ¹Department of Biological Sciences, Messiah College, Mechanicsburg, PA 17055. ²Department of Biochemistry and Molecular Biology, Penn State College of Medicine, Hershey, PA 17033.

8:45am – 9:00am

8. *Down-Regulation of Cholecystokinin mRNA Expression in Pancreatic Cancer Cells.* **Perta, Julie M.***,

Mackenzie Stamer, and **John F. Harms**. Department of Biological Sciences, Messiah College, Mechanicsburg, PA 17055.

9:00am – 9:15am

9. *The Culturing and Immortalization of Murine Fallopian Tube Secretory Cells as a New Method of Studying Ovarian Cancer*. **Vail, Caroline***, **Adin Kugelmass**, and **Robert Kurt**. Lafayette College, Easton, PA 18042.

9:15am – 9:30am

10. *Construction of an Inducible Eukaryotic Expression Vector to Down-regulate Myd88 expression in a Mouse Breast Cancer Model*. **Serrano, Antonio*** and **Robert Kurt**. Lafayette College, Easton, PA 18042.

9:30am – 9:45am

11. *Identification of Phosphorylation Dependent Interactions Between Replication Protein A and Cellular Proteins in Saccharomyces cerevisiae*. **Mahoney, Chelsea***, **Michaela Ortiz**, **Kayla Hager**, and **André Walther**. Cedar Crest College, Allentown, PA 18104.

9:45am – 10:00am

12. *Replication Protein A Phosphorylation Regulates Telomere Length In The Budding Yeast Saccharomyces cerevisiae*. **Pattison, Amanda***, **Molly McQuilken**, and **André P. Walther**. Cedar Crest College, Allentown, PA 18104.

ORAL SESSION III

SATURDAY, APRIL 6

8:30 – 10:00am

METABOLISM AND STRESS RESPONSES

Swarts 111

Christopher Brey, Session Chair

8:30am – 8:45am

13. *Evaluating the Genetic Response to Cold Stress in the Eurosta solidaginis*. **Lewis, Darnell*** and **Sara M. Turner**. Mercyhurst University, Erie, PA 16546.

8:45am – 9:00am

14. *Heat Shock Induces ROS Production and Histone Phosphorylation in Coelomocytes of Eisenia hortensis*. **Tumminello, Richard***, **Tara Brennan***, and **Sheryl Fuller-Espie**. Cabrini College, Radnor, PA 19087.

9:00am – 9:15am

15. *The Effects of Brain-Derived Neurotrophic Factor on Neuronal Injury in an Oxidative Stress Model of Amyotrophic Lateral Sclerosis*. **Rutkoski, Kayla***, **Daniel Simpson**, **Mara Olenick**, and **Barbara Fenner**. King's College, Wilkes-Barre, PA, 18711.

9:15am – 9:30am

16. *The Effects of Brain-Derived Neurotrophic Factor on Neuron Survival in a Glutamate-induced Oxidative Stress Model of Progressive Supranuclear Palsy*. **Simpson, Daniel***, **Kaitlyn Runner**, **Mara Olenick**, **Kayla Rutkoski**, and **Barbara Fenner**. King's College, Wilkes-Barre, PA, 18711.

9:30am – 9:45am

17. *Elucidating the Effects of Manganese on Dopaminergic Cell viability and Dopamine Metabolism*. **Ewing, Sarah^{1*}**, **Michael Groesch¹**, **Nicholas Amata¹**, and **Thomas Corso²**. ¹Gannon University, Erie, PA 16541, ²Lake Erie College of Osteopathic Medicine, Erie, PA 16508.

9:45am – 10:00am

18. *Characterization of Krüppel-Like Transcription Factor KLF-2 expression level in Caenorhabditis elegans using RT-PCR*. **Brey, Christopher** and **Matthew McDonnell***. Marywood University, Scranton, PA 18509.

POSTER SESSION I

SATURDAY, APRIL 6

10:00 – 11:30am

ECOLOGY

Old Field House

Howard Whidden, Session Chair

19. *Metal Absorption in Ulothrix zonata (Chlorophyta, Ulthraciases) from Sediment Contaminated with Acid Mine Drainage*. **Lyons, Monica***, **Brad E. Engle**, and

Deborah S. Austin, Wilson College, Chambersburg, PA 17201.

20. †*The Effect of Large Woody Debris Addition on Stream Morphology and Fish Habitat in the Allegheny National Forest.* **Hake, Brandi A.*** and **A.M. Turner**. Clarion University. Clarion, PA 16214.

21. †*Passive and Active Macroinvertebrate Collection Method Assessment along Adjacent Reaches of the River.* **Guild, Katherine*, Jack R. Holt**, and **Michael D. Bilger**. University, Selinsgrove, PA 17870.

22. *Initial Survey of Benthic Macroinvertebrates from Trout Brook, Luzerne County, Pennsylvania.* **Corpus, Larry*** and **Barbara McCraith**. Misericordia University, Dallas, PA 18612.

23. *Water Quality Assessment of Middle Creek, Snyder County, PA.* **Nicholls, Phoebe*** and **Ahmed Lachhab**. University, Selinsgrove, PA 17870.

24. †*Monitoring Nutrient and Sediment Loads and Effectiveness of Farm BMP's.* **Reinford, Quentin*** and **Mel Zimmerman**. Lycoming College, Williamsport, PA 17701.

25. †*Biological Assessment of the Upper Main Stem of the River Using Phytoplankton and Periphyton.* **Santiago, Marc A.*** and **Jack R. Holt**. University, Selinsgrove, PA 17870.

26. †*Biological Response of Two North Central PA streams after the Flood of September 2011.* **Rogers, Fred*** and **Mel Zimmerman**. Lycoming College, Williamsport, PA 17701.

27. *Contribution of Lycoming College Clean Water Institute to PFBC Unassessed Waters Project, 2010-2012.* **Zimmerman, Mel***. Lycoming College, Williamsport, PA 17701.

28. *Characteristics of Water Quality in Trout Brook Creek, Luzerne County Pennsylvania.* **Bucha, John*** and **Jena Hassinger***. Misericordia University, Dallas PA 18612.

29. †*The Influence of Fish Odor on the Emergence Time of the Invasive New Zealand Mud Snail (Potamopyrgus antipodarum).* **Metz, Elizabeth*, Christina Lehman*, Megan Radyk***, and **Edward P. Levri**. Penn State Altoona, Altoona, PA 16601.

30. †*The Effect of Crayfish Odor on the Behavior of the Invasive New Zealand Mud Snail (Potamopyrgus antipodarum).* **Menaquale, Frank*, Elissa Colledge, Brittany Smith**, and **Edward P. Levri**. Penn State Altoona, Altoona, PA 16601.

31. †*The Effect of Light Intensity on the Photokinetic Behavior of the New Zealand Mud Snail (Potamopyrgus antipodarum).* **Mantero, Patricia*, Sarah Landis, Brittany Smith, Elissa Colledge, Alyssa, Byrd**, and **Edward P. Levri**. Penn State Altoona, Altoona, PA 16601.

32. *Use of Cover by Prey in Response to Single and Multiple Predator Species.* **Sohle, Brittany*** and **Garett Barr**. King's College, Wilkes-Barre, PA 18711.

33. †*Analysis on Concentrations of 17 β -Estradiol in African Clawed Frogs (Xenopus laevis) Treated with Chloroform and Iodoacetic Acid, Common Endocrine Disrupting Compounds, Resulting from Water Disinfection Procedures.* **Movsesyan, Ovsanna*, M. Dana Harriger, Laura F. Altfeld**, and **Catherine T. Santai**. Wilson College, Chambersburg, PA 17201.

34. †*The Indirect Effects of Paved Roads on Redback Salamanders (Plethodon cinereus) in Spring Valley Park, York County, PA.* **Crimmins, Christopher S.*** and **Bridgette E. Hagerty**. York College of Pennsylvania, York, PA 17403.

35. †*First Case of Myiasis in the Laurent's Whiptail Lizard, Cnemidophorus murinus murinus, by the New World Screwworm, Cochliomyia hominivorax, on the Southern Caribbean Island, Curaçao.* **Hughes, Daniel*** and **Pablo R. Delis**. Department of Biology, Shippensburg University, Shippensburg, Pennsylvania 17257.

36. *Altered Sedation but Not Tolerance in a Drosophila Model of Alcoholism.* **Baylor, Jessica*, Ayari Diaz-Kelly*, Katie King***, and **Elaine R. Reynolds**. Lafayette College, Easton, PA 18042.

37. *Effects of Dietary Modulation in a Drosophila Epilepsy Model.* **Gannon, David*, Kofi Boateng***, and **Elaine R. Reynolds**. Lafayette College, Easton, PA 18042.

38. †*The Effects of Yohimbine on Ethanol Preference, Motor Coordination and c-Fos Phosphorylation in the Nucleus Accumbens of CD-1 Mice.* **Perez, Rafael***,

Ronald Kaltreider, and **Bradley Rehnberg**. York College of Pennsylvania, York, PA 17403.

39. †*Analysis of Aggressive Behavior, Somatic Growth Rates, and Somatostatin Neurons in Male and Female Rocio octofasciata (Jack Dempsey Cichlids)*. **Os-wald, Kaitlin A. ***, **Francesca L. Prendes, Kristen A. Sigley**, and **Audrey J. Ettinger**. Cedar Crest College, Allentown, PA 18104.

40. †*Biliverdin: Presence and Potential Applications Sturnus vulgaris*. **Karanfilian, Briette*** and **Michael W. Butler**. Lafayette College, Easton, PA 18042.

41. †*Trophic Analysis of a Great-Horned Owl (Bubo virginianus) Diet in Order to Better Regulate Local Mammal Populations*. **Boyd, Matthew***, and **Carlos A. Iudica**. Department of Biology, Susquehanna University, Selinsgrove, PA.

42. *Comparison of Barn Owl (Tyto alba) Sex Ratios Between Southeastern and Northeastern Pennsylvania*. **Pontuti, Kaitlyn M. *** and **Karl Kleiner**. York College of Pennsylvania, York, PA 17403.

43. *A Pictorial Atlas and Key to Identify All Living Pennsylvania Mammal Species Using Hair's Cuticular Scales and Medullar Patterns*. **Butts, Megan R. *** and **Carlos A. Iudica**. Department of Biology, University, Selinsgrove, PA 17870.

44. †*Caching Choices of Rural and Urban Eastern Gray Squirrels (Sciurus carolinensis)*. **Browning, Johnathan A. *** and **Bradley G. Rehnberg**. York College of Pennsylvania, York, PA 17403.

45. *Monitoring of Summer Bat Activity and Maternity Colonies in the Delaware Water Gap National Recreation Area*. **Hauer, Christopher***, **Elizabeth McGovern***, **Olivia Stoken**, and **Howard P. Whidden**. East Stroudsburg University, East Stroudsburg, PA 18301.

46. †*Assessment of Skeletal Injuries in Bats Killed at an Eastern Pennsylvania Wind Farm*. **Shupinski, Alex***, and **Howard P. Whidden**. East Stroudsburg University, East Stroudsburg, PA 18301.

47. †*Longitudinal Study of Foraging Preferences of Castor canadensis in a Leatherleaf-Sedge Wetland Habitat*. **Barna, Laura*** and **Tammy Tintjer**. King's College, Wilkes-Barre, PA 18711.

48. *Use of DNA Fingerprinting to Determine the Breeding Patterns of Urban and Rural White-tailed Deer Herds*. **Latario, Luke***, **Fred J. Brenner, E. C. Vroegindewey, Megan Osborne, Michelle Peck, Richard Toth, Maire Casey, Stacey Senter**, and **Kaitlyn Bailey**. Grove City College, Grove City PA, 16127.

49. †*Familial Grouping of Female Odocoileus virginianus in a Hunted Environment*. **Knepper, Aneshia***, **Laura F. Altfeld, Deborah S. Austin**, and **Brad E. Engle**. Wilson College, Chambersburg, PA 17201.

ORAL SESSION IV

SATURDAY, APRIL 6

10:15 – 11:30am

WATER QUALITY

Fisher 107

Amy Diegelman-Parente, Session Chair

10:15 – 10:30am

50. †*Effects of the Artificial Sweetener Sucralose on the Foraging Behavior of the Yellow Mystery Snail, P. bridgessii*. **Diegelman-Parente, Amy, J. Michael Campbell**, and **Michael J. Gigliotti***. Mercyhurst University, Mercyhurst, PA 16546.

10:30 – 10:45am

51. †*Aptamer Development for Sucralose Using FLU-MAG SELEX*. **Diegelman-Parente, Amy** and **Gregg A. Robbins-Welty***. Mercyhurst University, Mercyhurst, PA 16546.

10:45 – 11:00am

52. †*Microbial Influence on the Persistence of Shiga toxin producing E. coli in Presque Isle Recreational Water*. **Opalko, Hannah***, **Kyle Lindsay**, and **Steven A. Mauro**. Mercyhurst University, Erie, PA 16546.

11:00 – 11:15am

53. †*The Active Ingredient in Anti-Depressants Acts Synergistically with Other Chemicals to Influence Levels of the Fecal Indicator Bacteria E. coli in Recreational Freshwaters*. **Mulugeta, Surafel, Eric Clark, Christina Vojtek***, and **Steven A. Mauro**. Mercyhurst

University, Erie, PA. 16546.

11:15 – 11:30am

54. †*Survey of Macroinvertebrate Communities as Biological Indicators of Water Quality Utilized for Assessing the Effects of Dam Removal Along the Bushkill Creek in Easton, Pennsylvania.* **Hughes, Ryan*** and **Megan Rothenberger.** Lafayette College, Easton, PA 18045.

ORAL SESSION V

SATURDAY, APRIL 6

10:15 – 11:30am

APPLICATIONS OF MOLECULAR BIOLOGY

Swarts 162

Dana Harriger, Session Chair

10:15 – 10:30am

55. †*Synthesis of a Key Intermediate and Analogs of Aspernigrin A.* **Sharber, Seth***, **William Tidwell, Kyle Burch,** and **Anne Reeve.** Messiah College, Mechanicsburg, PA 17055.

10:30 – 10:45am

56. †*The Effect of Posilac® on the Concentration of Insulin-like Growth Factor-1 (IGF-1) in Bovine Milk and Serum.* **Smentkowski, Chelsey¹***, **M. Dana Harriger¹,** **Deborah S. Austin¹,** and **Gaurav Deshmukh².** ¹Wilson College, Chambersburg, PA 17201. ²Meso Scale Discovery, Gaithersburg, MD 20877.

10:45 – 11:00am

57. †*Comparative Analysis of Viability Assays for Evaluation of Post-thaw Equine Spermatozoa.* **Krebs, Chelsea¹***, **M. Dana Harriger¹,** **Deborah S. Austin¹,** and **Julie Skaife².** ¹Wilson College, Chambersburg, PA 17201. ²Select Breeders Services, Chesapeake City, MD 21915.

POSTER SESSION II

SATURDAY, APRIL 6

1:30 – 3:00pm

PLANTS, MATHEMATICS, GIS, and MICROBIOLOGY

Old Field House

Larry Corpus, Session Chair

58. †*Presence and Identification of HSP70 in the Fall Webworm Caterpillar, Hyphantria cunea (Lepidoptera: Arctiidae).* **Matthews, Stephen*, Ronald Kaltreider,** and **Bradley Rehnberg.** York College of Pennsylvania, York, PA 17403.

59. †*Efficacy of Meristem-Tip Culture and Thermotherapy for OYDV and LYSV in Garlic (Allium sativum).* **Lerch, Elizabeth*, Jennifer Flack*,** and **Marlene Cross.** Mercyhurst University, Erie, PA 16546.

60. †*Are Clinical Rhodotorula Fungal Strains More Robust Than Environmental Strains?* **Simmon, Jennifer*, Lauren McKean,** and **Amy J. Reese.** Cedar Crest College, Allentown PA 18104.

61. †*A Novel Pedobacter Species Isolated From a Freshwater Creek.* **Snyder, Dillon* and Jeffrey D. Newman.** Lycoming College, Williamsport, PA 17701.

62. †*Biosynthesis and Toxicity of Gold and Silver Nanoparticles From Cave Microorganisms.* **Choy, Nicholas*, Jingyi Zhang, Jonathan Franks,** and **Om V. Singh.** University of Pittsburgh-Bradford, Bradford, PA, 16701.

63. †*Analysis of Microbial Community Differences between a Low Lying Area and an Upland Area.* **Singleton, David and Rob Harvey*.** York College of Pennsylvania, York, PA, 17403.

64. †*Isolation of Actinomycetes from Hot Soils Overlying the Centralia, PA Mine Fire.* **Luu, Larissa*, Kimberley McGrath*,** and **Tammy C. Tobin.** Susquehanna University, Selinsgrove, PA 17870.

65. *Analysis of Desert Crust Isolates for the Gene Encoding Bleomycin Resistance.* **Mastria, Michael*, Camila Moscoso,** and **Laurie Caslake.** Lafayette College, Easton, PA 18042.

66. †*Pairwise Comparisons of Professors*. **Melka, Richard F.** and **Hallie L. Kleiner***. University of Pittsburgh at Bradford, Bradford, PA 16701.
67. *The Usefulness of Mathematica*. **Cauvel, Philip E.*** and **Richard F. Melka**. University of Pittsburgh at Bradford, Bradford, PA 16701.
68. †*Maximizing Long-term Harvests*. **Melka, Richard F.** and **David R. Ware***. University of Pittsburgh at Bradford, Bradford, PA 16701.
69. *Graphical Depiction of Hysteresis and its Prevalence in Nature*. **Berrettini, Vincent***. University of Pittsburgh at Bradford, Bradford, PA 16701.
70. †*Effect of Extraction Method on Antibacterial Properties of Oils Derived from Salvia officinalis*. **Antonucci, Kelly*, Catherine T. Santai,** and **Brad E. Engle**. Wilson College, Chambersburg, PA 17201.
71. †*Different Methods of Crop Covering Used to Extend the Spring Growing Season In South Central Pennsylvania*. **Levitsky, Josh*, Seth Young,** and **Heather Sahli**. Shippensburg University, Shippensburg, PA 17257.
72. *The Effect of Nitrogen Levels on Perennial Ryegrass Herbivory*. **Mellert, Kelsey*** and **Tammy Tintjer**. King's College, Wilkes-Barre, PA 18711.
73. *Discernible Haploid Differences in Ecotypes, an Investigation in Arabidopsis thaliana L: Brassicaceae*. **Pater, Ryan*** and **Bruce Smith**. York College of Pennsylvania, York PA 17403.
74. *The Water Relations of Roundleaf Greenbrier (Smilax rotundifolia L.) Encroaching on Serpentine Barren Ecosystems in Southeastern Pennsylvania*. **Pistoia, Veronica*** and **Jessica L. Schedlbauer**. West Chester University, West Chester, PA 19383.
75. †*Interference to Old-Growth Forest Restoration Management by Hayscented Fern (Dennstaedtia punctilobula): Assessing the Ecological Impact and Management Response of a Native Species Behaving Invasively*. **Hockenberry, Samantha R.*** and **Suzanne Boyden**. Clarion University of Pennsylvania, Clarion, PA 16214.
76. †*Assessment of Plant Species Composition in Barren Areas on Blue Mountain in Palmerton, PA Affected by a Zinc Smelter*. **Augustine, Stephanie H.*** and **Amy E. Faivre**. Cedar Crest College, Allentown, PA 18104.
77. †*The Influence of Inflorescence Size and Number on the Following Year's Inflorescence Production in Mountain Laurel (Kalmia latifolia)*. **Moyer, Brian*, Julia Eckenrode, Maureen A. Levri,** and **Edward P. Levri**. Penn State-Altoona, Altoona, PA 16601.
78. †*The Effects of Insect and Fungal Damage on Reproduction in Mountain Laurel (Kalmia latifolia)*. **Eckenrode, Julia*, Brian Moyer, Maureen A. Levri,** and **Edward P. Levri**. Penn State Altoona, Altoona, PA 16601.
79. †*The Effect of Deer and Management on Tree Seedlings and Understory Richness in Pennsylvania Hardwood Forests*. **Lewis, Randa M.*** and **Suzanne Boyden**. Clarion University of Pennsylvania, Clarion, Pa 16214.
80. *The Effects of Prescribed Fire and Environmental Variation on Soil Respiration in the Serpentine Barrens of Southeastern Pennsylvania*. **Barren, Gregory*** and **Jessica L. Schedlbauer**. West Chester University, West Chester, PA 19383.
81. *Patterns in Hemlock Woolly Adelgid Abundance and Hemlock Growth in Eight Stands in Southcentral Pennsylvania*. **Eiseman, Mark D.*** and **Carol C. Loeffler**. Dickinson College, Carlisle, PA, 17013.
82. †*Monitoring the Hemlock Woolly Adelgid in Pennsylvania: Characterization of Cold Tolerance and Overwintering Physiology*. **Polaski, Anna*, Spacht, Drew, Tymochko, Larae,** and **Michael A. Elnitsky**. Department of Biology, Mercyhurst University, Erie, PA 16546.
83. *Application of Different Resolutions GPR Surveys to Identify Unmarked Graves at the Sharon Lutheran Church, Selinsgrove, PA*. **Kelly Steelman*, Alexander Zawacki,** and **Ahmed Lachhab**. Susquehanna University, Selinsgrove, PA 17870.
84. †*Long-Term Changes in Pattern of Occurrence of Strong Tornadoes and Outbreaks in the United States, 1900-2011*. **Schiff, Nicholas*** and **J. Michael Campbell**. Mercyhurst University, Erie, PA 16546.
85. *Impact of Coastal Lighting on Nesting Sea Turtles*

at Jekyll Island, GA. **Blough, Adam P.*** University of Pittsburgh Johnstown, Johnstown, PA 15904.

86. *Marcellus Shale: The Truth Behind This Treasure.* **Beau Close*, Joshua Durphy, Matthew Pekular, and Assad Panah.** University of Pittsburgh, Bradford, PA 16701.

ORAL SESSION VI

SATURDAY, APRIL 6

1:30 – 3:00pm

AQUATIC BIOLOGY

Fisher 107

Brandi Hake, Session Chair

1:30 – 1:45pm

87. *Monitoring Water Chemistry and Invertebrate Diversity in Cedar Creek, Allentown, PA.* **Epstein, Leia C.* and Amy E. Faivre.** Cedar Crest College, Allentown, PA 18104.

1:45 – 2:00pm

88. *Detection of DNA Damage in Brown Bullhead Fish from Lake Erie Using Comet Assay.* **Diegelman-Parente, Amy and Julianne E. Harmon*.** Mercyhurst University, Mercyhurst, PA 16546.

2:00 – 2:15pm

89. *Comparative Seasonal Analysis of Biofilm and Community Diversity Associated with Invasive Diatom Didymosphenia geminata in the Gunpowder River, Baltimore County, Maryland.* **Croushore-Kysor, Thomas* and J. Michael Campbell.** Mercyhurst University, Erie, PA, 16546.

2:15 – 2:30pm

90. *Analyzing the Effectiveness of Neodymium as a Shark Deterrent in the Pelagic Longline Fishing Industry to Reduce the Bycatch of Pelagic Shark Species.* **Kinley, Rachael*, Laura F. Altfeld, and Edward Wells.** Wilson College, Chambersburg, PA 17201.

2:30 – 2:45pm

91. *Using Louisiana Waterthrush (Parkesia motacil-*

la) and Insect Biodiversity to Gauge Productivity in Two Hemlock Habitats in Northeastern Pennsylvania. **Barnes, Katie B.* and T.L. Master.** East Stroudsburg University, Department of Biological Sciences, East Stroudsburg, PA 18301.

ORAL SESSION VII

SATURDAY, APRIL 6

1:30 – 3:00pm

WILDLIFE ECOLOGY

Swarts 162

Greg Czarnecki, Session Chair

1:30 – 1:45pm

92. *The Wild Resource Conservation Program: A Historical Perspective on 30 Years of Conservation.* **Czarnecki, Greg*.** Pennsylvania Department of Conservation and Natural Resources, Harrisburg, PA 17105.

1:45 – 2:00pm

93. *Landscape Genetics of the Coyotes (Canis latrans) of the Eastern United States.* **Rounsville Jr., Thomas^{1*}, Justin H. Bohling², and Jane E. Huffman¹.**

¹Northeast Wildlife DNA Laboratory, East Stroudsburg University, East Stroudsburg, PA 18301. ²The Pennsylvania State University, State College, PA 16802.

2:00 – 2:15pm

94. *Examining Deer Dispersal Patterns through Mitochondria DNA sequence Analysis.* **Seltzer, Jedediah*, Alex Rankin, Daniel Ackerman, Bethany Lashbrook, Erin Eperthener, and Fred J. Brenner.** Grove City College, Grove City, PA 16127.

2:15 – 2:30pm

95. *Rest Site Selection by Fishers (Martes pennanti) in the Eastern Deciduous Forest.* **Gess, Sean*, Hance Ellington, Matthew Dzialak, Joseph Duchamp, Matthew Lovallo, and Jeffrey Larkin.** University of Pittsburgh at Bradford, Bradford, PA 16701; Indiana University of Pennsylvania, Indiana, PA 15705; Hayden-Wing Associates, Laramie, WY 82070; Pennsylvania Game Commission, Harrisburg, PA 17110.

2:30 – 2:45pm

96. *Do Female Northern Saw-Whet Owls (Aegolius acadicus) Escort Their Offspring During Annual Fall Migration?* **Stromko, Caitlyn*** and **Karl Kleiner**. York College of Pennsylvania, York, PA 17403.

2:45 – 3:00pm

97. *Habitat Preference of the Hooded Warbler (Setophaga citrina) within Delaware Water Gap National Recreation Area.* **Vranicar Kutch, Jennifer*** and **Terry L. Master**. East Stroudsburg University, East Stroudsburg, PA 18301.

ORAL SESSION VIII

SATURDAY, APRIL 6

1:30 – 3:00pm

GENETICS & PROTEOMICS

Swarts 111

Alan Hale, Session Chair

1:30 – 1:45pm

98. *Comparative Expression Analysis of Phytophthora sojae Polysaccharide Lyase Family 3 Genes During Infection of the Soybean Glycine max.* **Komar, Hannah*** and **Manuel Ospina-Giraldo**. Lafayette College, Easton, PA 18042.

1:45 – 2:00pm

99. *†The Relative Impact of Bacteriophages CøSL1, CøSL2, and CøMD3 on the Growth of Escherichia coli.* **Huey, Samantha*** and **Alan Hale**. Cedar Crest College, Allentown, PA 18104.

2:00 – 2:15pm

100. *†Proteogenomics-Based Refinement of Mycobacteriophage Genomes.* **Moran, Deborah***, **Trevor Cross**, and **David Dunbar**. Cabrini College, Radnor, PA, 19087.

2:15 – 2:30pm

101. *†The Assembly and Annotation of the Chryseobacterium haifense Genome.* **Sontag, Thomas*** and **Jeff Newman**. Lycoming College, Williamsport, PA

17701.

ORAL SESSION IX

SUNDAY, APRIL 7

9:00 – 10:30am

ANIMAL ECOLOGY and PHYSIOLOGY

Fisher 107

Pablo Delis, Session Chair

9:00 – 9:15am

102. *†Snake Assemblage in a Reclaimed Wetland in Letterkenny Army Depot in South-Central Pennsylvania: Implications for Conservation.* **Anderson, James***, **Walter E. Meshaka Jr.**, and **Pablo R. Delis**. Shippensburg University, Shippensburg, PA 17257.

9:15 – 9:30am

103. *†Snake Assemblage Dynamics of Isolated Artificial Wetlands in South-Central Pennsylvania: Implications for Wetland Management and Conservation.* **Hughes, Daniel F.^{1*}**, **Pablo R. Delis¹**, and **Walter E. Meshaka Jr.²**. ¹Department of Biology, Shippensburg University, Shippensburg, Pennsylvania 17257. ²Section of Zoology and Botany, State Museum of Pennsylvania, Harrisburg, Pennsylvania 17120.

9:30 – 9:45am

104. *†Occurrence of Intraerythrocytic Parasites in Chrysemys picta, Chelydra serpentina, Sternotherus odoratus, and Trachemys scripta within Pennsylvania and New Jersey.* **Laubach, Larry L.*** and **John Becker**. East Stroudsburg University, East Stroudsburg, PA 18301.

9:45 – 10:00am

105. *†Effects of the klf-2 Gene on Caenorhabditis elegans Fecundity.* **Schilling, Megan***, **Matt McDonnell**, and **Christopher Brey**. Marywood University, Science Department, Scranton, PA 18509.

10:00 – 10:15am

106. *†The Impacts of Climate Change on the Overwintering Energetics and Microenvironmental*

*Conditions of the Goldenrod Gall Fly, Eurosta solidaginis. Spacht, Drew** and **Michael A. Elnitsky**. Department of Biology, Mercyhurst University, Erie, PA 16546.

10:15 – 10:30am

107. *†Oxidative Stress During Freezing and Thawing in the Freeze-Tolerant Woolly Bear Caterpillar, Pyrrharctia isabella. Tymochko, Larae** and **Michael A. Elnitsky**. Department of Biology, Mercyhurst University, Erie, PA 16546.

ORAL SESSION X

SUNDAY, APRIL 7

9:00 – 10:30am

ENVIRONMENTAL MOLECULAR BIOLOGY

Swarts 162

Amy Reese, Session Chair

9:00 – 9:15am

108. *†Purification and Comparative Study of L-Amino Acid Oxidase from Crotalus horridus (Timber Rattlesnake) Venoms. Goodwin, Connie*, Catherine T. Santai, M. Dana Harriger, and Brad Stiles*. Wilson College, Chambersburg, PA 17201.

9:15 – 9:30am

109. *†Isolation and Characterization of Indigenous Microorganisms from Cave Soil cultivated in an Electromagnetic Field. Yousif, Aziz¹*, Jingyi Zhang¹, Francis Mulcahy², and Om V. Singh¹*. ¹Division of Biological and Health Sciences, ²Department of Chemistry University of Pittsburgh at Bradford, Bradford, PA, 16701.

9:30 – 9:45am

110. *†Purification of Flexirubin Pigments from Chryseobacterium. Krebs, Jordan*, Andrew Gale, and Jeff Newman*. Lycoming College, Williamsport, PA 17701.

9:45 – 10:00am

111. *†Phenotypic Characterization of Environmental Rhodotorula Fungal Strains. McKean, Lauren**

Jen Simmon, and Amy J. Reese. Cedar Crest College, Allentown PA 18104.

10:00 – 10:15am

112. *Effects of a Quorum Sensing Inhibitor on Pseudomonad Biofilm Formation in Sandy Soil. Kimmel, Tiffany*, Laurie F. Caslake, Jasmine K. Saini, and Michael G. Galperin*. Lafayette College, Easton, PA 18042.

10:00 – 10:30am

113. *Prevalence of Toxoplasma gondii in New Jersey Black Bears (Ursus americanus). Flanley, Catherine**. East Stroudsburg University, East Stroudsburg, PA 18301.

ORAL SESSION XI

SUNDAY, APRIL 7

9:00 – 10:30am

IMMUNOLOGY

Swarts 111

Lawrence Mylin, Session Chair

9:00 – 9:15am

114. *†Construction of a Novel System to Analyze Recognition of MHC Class II-Restricted Epitopes by CD4⁺ T Cell Hybridoma Clones in vitro. Bray, Samuel* and Lawrence Mylin*. Messiah College, Mechanicsburg, PA 17055.

9:15 – 9:30am

115. *†Site-Directed Mutagenesis of Multiple Major Histocompatibility Class II-Restricted Epitopes in Simian Virus 40 Large Tumor Antigen. Schell, Stephanie* and Lawrence Mylin*. Messiah College, Mechanicsburg, PA 17055.

9:30 – 9:45am

116. *Identification and Characterization of Additional H-2^b-restricted T cell Epitopes within the Simian Virus 40 Large Tumor Antigen. Mylin, Lawrence*, Kevin Wile, Daniel Wingert, Chrissie Puchalo, Jeremy Haley, and Todd Schell*. Messiah College, Mechanicsburg, PA 17055 and Penn State Hershey

College of Medicine, Hershey PA 17033.

9:45 – 10:00am

117. *Cross-Receptor Desensitization of T Cell and Chemokine Receptors in the T cells of Tumor Bearing Mice.* **Higgins, Mary***, **Robert A. Kurt, Chun-wai Liew**, and **Anna Peterson***. Lafayette College, Easton, PA 18042.

10:00 – 10:15am

118. *The Measure of Damage Associated Molecular Pattern Molecules and Their Role in Recruiting Suppressor Cells in Tumor Bearing Mice.* **Vrakas, Christine*** and **Robert Kurt**. Lafayette College, Easton, PA 18042.

10:15 – 10:30am

119. *The Damaging Effects of Auranofin on 4T1 Murine Mammary Carcinoma Cells.* **Liberti, Maria*** and **Robert Kurt**. Lafayette College, Easton, PA 18042.

POSTER SESSION III

SUNDAY, APRIL 7

10:30am – 12:00pm

CELL AND MOLECULAR BIOLOGY

Old Field House

Angela Asirvatham, Session Chair

120. *Creating a Tetracycline Inducible Eukaryotic Expression Vector Encoding shRNA Specific for Myd88 Using Two Recombination Reactions.* **Phuong, Tiffany***, **David Jennings**, **Antonio Serrano**, and **Robert Kurt**. Lafayette College, Easton, PA 18042.

121. *Murine Mammary Carcinoma Cell Growth Inhibition by Auranofin.* **Rubin, Amanda***, **Noelle Kosarek***, **Maria Liberti**, and **Robert Kurt**. Lafayette College, Easton, PA 18042.

122. *Control of DNA Damage Signaling by SSPP/SSPT Motifs in *Aspergillus nidulans* *snoA^{Rif}*.* **Orzechowski, Amanda*** and **Steven James**. Biology Department, Gettysburg College, Gettysburg, PA 17235.

123. *An Anti-Checkpoint Role for *Aspergillus nidulans* *snoA^{Rif}*.* **Nguyen, Cam*** and **Steven James**. Biology Department, Gettysburg College, Gettysburg PA 17235.

124. *Generation of New *snoA^{Hrb1}* Alleles by a Non-Complementation Assay.* **Kohlbrenner, Emily*** and **Steve James**. Biology Department, Gettysburg College, Gettysburg, PA 17235.

125. *Analysis of Protein Interactions Using the Cross and Capture method in *Saccharomyces cerevisiae*.* **Cutaiar, Gabrielle*** and **André Walther**. Cedar Crest College, Allentown, PA 18104.

126. *The Development of a Novel qPCR Assay to Measure Homologous Recombination in Replication Protein A Mutant *Saccharomyces cerevisiae*.* **Preston, Jennifer***, **Jessica Kline**, and **André P. Walther**. Cedar Crest College, Allentown, PA 18104.

127. *Development of PCR-Based Assay to Measure Telomere Length and Structure in *Saccharomyces cerevisiae*.* **Sparno, Nicole*** and **André P. Walther**. Cedar Crest College, Allentown, PA 18104.

128. *The Correlation Between Maternal Pre-Natal Diet and Blood Leptin Levels of Adult Offspring in CD-1 Mice.* **Mast, Jesse*** and **Bradley Rehnberg**. York College of Pennsylvania. York, PA 17403.

129. *Evaluation of Lipid Deposition in *klf-2* Mutant *Caenorhabditis elegans*.* **Sheagley, Jordan** and **Christopher Brey***. Science Department, Marywood University, Scranton, PA, 18509.

130. *The Efficacy of Vitamin K Supplementation When Administered With or Without Coagulation Factor IX on the Treatment of Hemophilia B in a Mouse Model.* **Croft, Kayla***, **Brad E. Engle**, and **Catherine T. Santai**. Wilson College, Chambersburg, PA 17201.

131. *Altered levels of the Yeast Proteasome Maturation factor Ump1p Affect the Response of *Saccharomyces cerevisiae* to Volatile Anesthetics.* **Erickson, Evelyn T. M.***, and **Laura K. Palmer**. Penn State Altoona, Altoona, PA 16601.

132. *Identifying the Molecular Mechanisms Underlying the Reduced Reprogramming Efficiency of Ataxia Telangiectasia Mutated Cells.* **Warner, Tyler P.***, **Ronald P. Hart**, **Jennifer C. Moore**, and **Melissa**

Boldridge. Rutgers University, Piscataway, NJ 08855.

133. †*The Influence of Phosphorylated-Akt/PKB on the Expression of A-Kinase Anchoring Proteins in Mitogen-Stimulated Neonatal Rat Schwann Cell Cultures.* **Yurko, Danielle¹, Kendra Spears^{1*}, Rick Stahl², David Carey², and Angela Asirvatham¹.** ¹Misericordia University, Dallas, PA 18612, ²Weis Center for Research, Geisinger Clinic, Danville, PA 17822.

134. †*Understanding the Cellular and Molecular Mechanisms of Neural Protection by Ginkgo biloba in a Gallus gallus Primary Neuron Culture.* **Rocklyn, Amanda E.^{*}, Allison M. Osborne^{*}, Alicia A. Zook, K. Joy Karnas, and Audrey J. Ettinger.** Cedar Crest College, Allentown, PA 18104.

135. †*The Effects of BDNF on Neuronal Survival in an Oxidative Stress Model of Huntington's Disease.* **Olenick, Mara^{*}, Kayla Rutkoski, Dan Simpson, and Barbara Fenner.** King's College, Wilkes-Barre, PA 18711.

136. †*The Effects of Brain-Derived Neurotrophic Factor and Vascular Endothelial Growth Factor on Glutamate-Induced Cell Death in SH-SY5Y Cells.* **Runner, Kaitlyn^{*}, Jenni Lisiewski, and Barbara Fenner.** King's College, Wilkes-Barre, PA 18711.

137. †*Investigation into of the Levels and Roles of Alpha-1,3-Glucanase of Cryptococcus neoformans.* **Korpics, Samantha^{*}, Laura Mascibroda, Amber Green^{*}, and Amy J. Reese.** Cedar Crest College, Allentown PA 18104.

138. *Exploring the Role of CUF1 in Phagocytosis of C. neoformans var neoformans.* **Manes, Chelsea^{*} and Jeramia Ory.** King's College, Wilkes-Barre, PA 18711.

139. †*A Method for Determining the Involvement of Glycoprotein G_N in Hantavirus-Host Cell Binding.* **Kunch, Alexa^{*} and Meda Higa.** York College of Pennsylvania, York, PA 17403.

140. †*Growth Response of Non-Resistant and Putative Resistant Hosts to Three Coliphages.* **Casey, Abigail^{*}, Chelsea Seibert, Kathleen Spickard^{*}, Amanda Walck^{*}, and Alan Hale.** Cedar Crest College, Allentown, PA 18104.

141. †*Determination of the Initial Latency Peri-*

od of Coliphage, CøSL1. **Shivani Desai^{*}, Chelsea Thompson, and Alan Hale.** Cedar Crest College, Allentown, PA 18104.

142. †*Analysis of the Resurgence of Bacterial Growth After Phage Infection.* **Faust, Lindsay^{*} and Alan Hale.** Cedar Crest College, Allentown, PA 18104.

143. *Effect of Triclosan Soap on Diversity of Triclosan-Resistant Bacteria on Hands.* **Abraham, Sherin^{*}, Amanda Nassar, and Jeanne Kagle.** Mansfield University of Pennsylvania, PA 16933.

144. †*Factors influencing Staphylococcus aureus Nasal Carriage Rate and Antibiotic Resistance Prevalence among College Students: 2007-2012.* **Fabie, Joshua E.^{*} and Carolyn F. Mathur.** Department of Biological Sciences, York College of Pennsylvania, York, PA 17403.

145. *Microbes in Cosmetics: Piloting a Microbial Investigation for the General Biology Laboratory.* **Spitz, Mia^{*}, Stacy Nganga^{*}, Laurie F. Caslake, and John O. Drummond.** Lafayette College, Easton, PA 18042.

146. *Examination of Fluoride Levels in Beverages Commonly Consumed by Children.* **Rittenhouse, Jennifer^{*} and Marianne Staretz.** Cedar Crest College, Allentown, PA 18104.

147. †*Analysis of β -carotene Production by Gordonia sp.-SD4 Isolated from Cave Soil.* **Zhang, Jingyi^{*}, Aziz Yousif, Francis Mulcahy, and Om V. Singh** University of Pittsburgh at Bradford, Bradford, PA 16701.

148. †*Further Investigations of Bisphenol A Leaching From Plastics.* **Andrayko, Kelsey^{*} and Marianne Staretz.** Cedar Crest College, Allentown, PA 18103.

149. †*Investigation of mRNA Degradation in Biological Fluids for Time of Deposition Estimation.* **Schaeffer, Erin^{*}, Kimberly Barry, Chandler Grant, and K. Joy Karnas.** Cedar Crest College, Allentown, PA 18104.

150. *Solvent Effects on the Absorption and Fluorescence Spectra of Cocaine and Common Cutting Agents.* **Staretz, Marianne and Alexis Hightman^{*}.** Cedar Crest College, Allentown, PA 18104.

151. *The Synthesis and Characterization of Halogenated Barium Apatites*. **Schaeffer, Richard, Julie Fenton***, and **Caleb Wehrmann***. Messiah College, Mechanicsburg, PA 17055.

152. *Overexpression and FPLC-Purification of the DNA Polymerase from *T. aquaticus**. **Diegelman-Parente, Amy, Erin J. Cox***, and **Jennifer C. Coulombe***. Mercyhurst University, Mercyhurst, PA 16546.

153. *†Characterizing *Rhodotorula* Strains Using a Genotypic Approach*. **Akers, Natalie*** and **Amy J. Reese**. Cedar Crest College, Allentown PA 18104.

154. *†Average-Nucleotide Identity protein-coding (ANIpC): Novel Genomic-Based Method to Differentiate Bacterial Species*. **Krebs, Jordan, Andrew Gale***, **Tom Sontag**, and **Jeff Newman**. Lycoming College, Williamsport, PA, 17701.

155. *†Sequencing the Glyceraldehyde-3-Phosphate Dehydrogenase Gene in Various Plants*. **Al-Dhumani, Sajaad*** and **Beth Facchine***. Gannon University, Erie, PA 16541.

ORAL SESSION XII

SUNDAY, APRIL 7

10:45am – 12:00pm

AQUATIC BIOLOGY and SYSTEMS MONITORING

Fisher 107

Daniel Hughes, Session Chair

10:45 – 11:00am

156. *Competitive Interactions Between the Blue Crab, *Callinectes sapidus*, and the Asian Shore Crab, *Hemigrapsus sanguineus**. **Pong, Alex*** and **Megan Rothenberger**. Lafayette College, Easton, PA 18042.

11:00 – 11:15am

157. *Female Reproductive Biology of Marbled Salamanders, *Ambystoma opacum*, in a Population of South Central Pennsylvania*. **Williams, Stephanie I.***, **Pablo R. Delis**, and **Walter E. Meshaka Jr.** Shippensburg University, Shippensburg, PA 17257.

11:15 – 11:30am

158. *Morphometrics, Demographics, and Movements of Marbled Salamanders, *Ambystoma opacum*, in South Central Pennsylvania*. **Bartle, Sarah R.***, **Pablo R. Delis**, and **Walter E. Meshaka Jr.** Shippensburg University, Shippensburg, PA 17257.

11:30 – 11:45am

159. *PPCP's and the Effects on Aquatic Life*. **Diegelman-Parente, Amy***. Mercyhurst University, Mercyhurst, PA 16546.

11:45am – 12:00pm

160. *Fifty Years Later: Re-Examining the Cultural Eutrophication Problem in Raritan Bay, NJ Using Environmental Monitoring and Multivariate Ordination Techniques*. **Rothenberger, Megan, Thomas Swaffield***, **Alyssa Calomeni**, and **Carolyn Cabrey**. Lafayette College, Easton, PA 18042.

12:00 – 12:15pm

161. *Automated Profiling Buoy for Exploring Lakes as Sentinels of Change: ARTHUR at Lake Lacawac*. **Knoll, Lesley B. 1***, **Jennifer A. Brentrup²**, **Craig E. Williamson²**, and **Bruce R. Hargreaves³**. ¹Lacawac Sanctuary Biological Field Station, Lake Ariel, PA, ²Miami University, Oxford, OH, ³Lehigh University, Bethlehem, PA.

ORAL SESSION XIII

SUNDAY, APRIL 7

10:45am – 12:00pm

GEOGRAPHY/GIS

Swarts 162

William Kory, Session Chair

10:45 – 11:00am

162. *Mapping Horizontal Sea-Level Rise Using Vegetation Communities at Little Creek Wildlife Area, Kent County, Delaware*. **Coxe, Robert***. Delaware Natural Heritage and Endangered Species Program, Smyrna, DE 19977.

11:00 – 11:15am

163. *Seventy-Five Years of Marsh Change in the Gray Farm and Penuel Tracts of Milford Neck Wildlife Area, Kent County, Delaware.* **Coxe, Robert***. Delaware Natural Heritage and Endangered Species Program, Smyrna, DE 19977.

11:15 – 11:30am

164. *Where the Freight Trains No Longer Stop: Deindustrialization, Environmental and Economic Effects, and Community Response in Johnstown, Pennsylvania* **Wolff, Jacob***. University of Pittsburgh at Johnstown, Johnstown, PA 15904.

11:30 – 11:45am

165. *Geography – Bridging the Social and Natural Science.* **Kory, William***. University of Pittsburgh at Johnstown, Johnstown, PA 15904.

11:45am – 12:00pm

166. *The Preservation of the Bog Turtle and Their Habitats.* **Blough, Adam P***. University of Pittsburgh at Johnstown, Johnstown, PA 15904.

ORAL SESSION XIV**SUNDAY, APRIL 7****10:45am – 12:00pm****EDUCATION****Swarts 111****Peter Olszewski, Session Chair****10:45 – 11:00am**

167. *†A Bacteriophage Neutralization Exercise for a Microbiology For Health Professions Course Laboratory.* **Wingert, Daniel***, **Kevin Wile**, **Victoria Himmelberger**, and **Lawrence Mylin**. Messiah College, Mechanicsburg, PA 17055.

11:00 – 11:15am

168. *Teaching Millennials how to Study Under the 21st Century Sky.* **Olszewski, Peter***. Penn State Erie, The Behrend College, Erie, PA 16563.

Abstracts of Papers
89th Annual Meeting
of the Pennsylvania Academy of Science
April 5 – 7, 2013
University of Pittsburgh, Bradford
Bradford, PA

(Arranged in alphabetical order of first authors or presenters)

Abraham, Sherin*, **Amanda Nassar**, and **Jeanne Kagle**. Mansfield University of Pennsylvania, PA 16933. *Effect of Triclosan Soap on Diversity of Triclosan-Resistant Bacteria on Hands* — Antibacterial soaps are cleaning agents with antibacterial ingredients such as, but not limited to, triclosan, triclocarban and chloroxylenol. It has been proposed that the regular use of antibacterial soaps could cause drug-resistant bacteria. Triclosan is used as a synthetic broad-spectrum antimicrobial agent. This research was a follow up on a previously done research to recognize the diversity of triclosan resistant bacteria on the hands of subjects who had washed with triclosan-containing soap or control soap for a period of eight weeks. For this research, we wanted to see if washing with triclosan containing soap alter the community of triclosan resistant bacteria on hands. The triclosan-resistant bacteria cultured off subjects' hands before and after the experimental period were identified by their colony characteristics. Also PCR of the ribosomal intergenic spacer region was done to genetically differentiate organisms that were similar. Diversity (Shannon-Weiner) was calculated to compare the communities of triclosan-resistant bacteria before and after the eight week in the experimental and control groups. No significant change in diversity was detected in either the experimental or control group. This suggests that triclosan did not have a major effect on the bacterial communities on hands. **(150)**

Akers, Natalie* and **Amy J. Reese**. Cedar Crest College, Allentown PA 18104. *Characterizing *Rhodotorula* Strains Using a Genotypic Approach* — Fungi are eukaryotic organisms found in our everyday environment. They can be helpful, such as yeast used in bread making, or harmful, such as the mold causing athlete's foot. While athlete's foot is unpleasant, it is mild. On the more deadly end of the spectrum lie *Cryptococcus* and *Rhodotorula*; these are fungi that can cause serious problems in immunocompromised individuals. This research is focused on *Rhodotorula*, using previous *Cryptococcus* studies as models. *Cryptococcus* has been genotyped using multi-locus sequencing typing (MLST) and the analysis of seven signature gene sequences allowing strains to be classified based on genomic differences. We hypothesize that *Rhodotorula* can be genotyped using the primers designed

for the loci of *Cryptococcus* as well as for the internal transcribed spacer (ITS) region used to type many fungi. We have amplified one MLST locus and the ITS region of a set of strains and have obtained sequence data. Preliminary analysis suggests that the majority of the strains are *Rhodotorula mucilaginosa*, based on a comparison of GenBank sequences for the amplified ITS region. Our known strain of *Rhodospiridium toruloides* was also correctly identified using these sequences, validating our methods. We are currently applying this method to a larger set of clinical and environmental strains. It is the goal of this research to add genotypic characterizations to the phenotypic data that we have on our collection of *Rhodotorula* strains and to provide a way to analyze these fungi in the medical and research setting. **(160)**

Al-Dhumani, Sajaad* and **Beth Facchine***. Gannon University, Erie, PA 16541. *Sequencing the Glyceraldehyde-3-Phosphate Dehydrogenase Gene in Various Plants* — The GAPDH gene is pivotal in the process of glycolysis, as it is the gene for glyceraldehyde-3-phosphate dehydrogenase. The GAPDH gene from the plants *Brassica oleracea* var. *botrytis*, commonly named broccoli, *Tagetes patula*, commonly named marigold, *Perovskia atriplicifolia*, commonly called Russian sage, and *Asparagus officinalis*, commonly named asparagus, are isolated, sequenced, and characterized. The GAPDH enzyme is present not only in plants, but also in animals, fungi, bacteria, and protists, and the gene that codes for it is highly conserved and considered a housekeeping gene. The nucleic acid is extracted, and then using PCR, the GAPDH region is amplified. After purification, the product is ligated into a plasmid vector, and *E. coli* bacteria, strain HB101 K-12, is transformed with the vector. Upon isolation, the plasmid is analyzed by restriction digestion and the DNA is sequenced using forward and reverse primers: pJETF and pJETR. A bioinformatics analysis is then conducted of the cloned gene to determine the sequence of the GAPDH gene of *Brassica oleracea* var. *botrytis*, *Tagetes patula*, *Perovskia atriplicifolia*, and *Asparagus officinalis*. The sequenced gene was then compared to different plants in Genbank. **(162)**

Anderson, James*, Walter E. Meshaka Jr., and Pablo R. Delis. Shippensburg University, Shippensburg, PA 17257. *Snake Assemblage in a Reclaimed Wetland in Letterkenny Army Depot in South-Central Pennsylvania: Implications for Conservation* — Wetlands are highly productive and biodiverse habitats threatened from anthropogenic pressures. The reclamation and restoration of wetlands are common practices designed to augment terrestrial ecosystem richness and counter wetland decline. Snakes can be prominent members of wetland communities, yet are infrequently studied with regards to their assemblage dynamics in these habitats. In 2012, we investigated two established small wetlands (Entrance Ponds) and a reclaimed wetland (Baker's Pond) in Letterkenny Army Depot (LEAD) in south-central Pennsylvania to determine and compare the status of their snake assemblages. Systematic cover board checks and opportunistic searches during March-October of 2012 were employed to individually mark and examine snakes ascertain sex, reproductive status, and health at the three locations. Four species of snakes; Northern Water Snake (*Nerodia sipedon*), Eastern Racer (*Coluber constrictor*), Common Garter Snake (*Thamnophis sirtalis*), and the Eastern Milk Snake (*Lampropeltis triangulum*) were detected at both sites. Nine individuals were marked at Baker's Pond and 32 individuals were captured at the two Entrance Ponds. The Northern Water Snake was the most abundant species both at Baker's Ponds (55% of captures) and Entrance Ponds (50% of captures). No males were found throughout the entire study season at Baker's Pond, while six males were captured at Entrance Ponds. A juvenile marked at Entrance Ponds was collected at the reclaimed wetland. A nearby source of Northern Water Snakes appears to have aided in the rapid colonization of this snake species at Baker's Pond in the 5 years since its construction. (109)

Andrayko, Kelsey* and Marianne Staretz. Cedar Crest College, Allentown, PA 18103. *Further Investigations of Bisphenol A Leaching From Plastics* — Bisphenol A (BPA) is used in the production of polycarbonate plastics. Polycarbonate plastics containing BPA have been used in baby bottles, kitchen dishes, and as varnishes on the inside of cans and other packaging used for storing food, beverages, and pharmaceuticals. A report issued by the National Toxicology Program in 2008 and supported by the report of the Food and Drug Administration in 2010 expressed some concern for the effects of BPA on brain, behavior and the prostate gland in fetuses, newborns and children. Given the concerns about BPA exposures especially in babies and children, the current study investigated the leaching of BPA from disposable water bottles under various conditions. An ELISA assay was used to quantify BPA in eleven brands of water bottles. Each brand had six samples with different preparations. The sample

preparations included: room temperature, sitting in a warm car for 24 hours, refrigerated, microwaved for 60 seconds per 8 ounces, refilled three times, and placed in the freezer until completely frozen and then thawed. The results of these analyses will be presented. (155)

Antonucci, Kelly*, Catherine T. Santai, and Brad E. Engle. Wilson College, Chambersburg, PA 17201. *Effect of Extraction Method on Antibacterial Properties of Oils Derived from *Salvia officinalis** — This study sought to determine if the antibacterial effectiveness of an oil extracted from a plant depends upon the method of extraction. Three methods of removing oil from a plant were investigated. Solvent extraction utilizes low temperatures (room temperature), exposes plant leaves to organic solvent, and introduces the possibility of residual organic solvent contamination of the resultant oil. Steam distillation involves elevated temperatures (100°C) and no exposure to organic solvent. Microwave-assisted pyrolysis (MAP) involves exposure of plant leaves to high temperatures (400-500°C) in the absence of oxygen to vaporize the lipid components and ultimately create a bio-oil. Oil was extracted from *Salvia officinalis* (common sage) using the three different methodologies and tested for antibacterial effectiveness against two different types of bacteria, *Escherichia coli* and *Staphylococcus aureus*, using a Kirby-Baur assay. The antibacterial effectiveness of the prepared Sage oils, a commercially produced steam-distilled sage oil, and antibiotic penicillin were compared. For *Salvia officinalis*, the method of extraction did affect the antibacterial properties of the oil. The observed order of *Salvia officinalis* oil effectiveness against *E. coli* was solvent extract < MAP < steam distilled. (79)

Augustine, Stephanie H.* and Amy E. Faivre. Cedar Crest College, Allentown, PA 18104. *Assessment of Plant Species Composition in Barren Areas on Blue Mountain in Palmerston, PA Affected by a Zinc Smelter* — Until the plant closed in the 1980s, smog from zinc smelters at the New Jersey Zinc Company turned the forested slopes of Blue Mountain into a barren wasteland. In recent years, the land has been restored in some areas to form many acres of thriving grassland due to the reseeded efforts organized by the Lehigh Gap Nature Center. Yet areas with very little vegetation persist, scattered across the hillside. The patches appear to consist of a loose, powdery soil, black in color. We surveyed 11 of these patches located in three regions of the reseeded hillside. Patches were mapped with a Garmin GPSmap 76 unit, most were somewhat circular with diameters of 5-6m. In ten of the patches at least 20% of the vegetation coverage was sandwort (*Minuartia patula*). Moss was found in all but two of the patches, and was only the dominant coverage in one patch. A variety of the grasses used to reseed the mountainside was found in each of the patches with switchgrass (*Panicum virgatum*) present in all patches. The distribution and dominance of plant species in these patches differs somewhat from the surrounding mountainside areas which are mostly covered with

the 10 grass species used to reseed the mountainside. In addition to vegetation comparisons, soil has been collected inside the patches and in the surrounding areas outside the patches to test for concentrations of zinc, lead and cadmium. Previous studies have indicated that historically some regions had zinc concentrations >130,000ppm believed to be caused by direct wind deposition from the smelter. (84)

Bailey, Kimberly M.* University of Pittsburgh Bradford, Bradford, PA 16701. *The Fundamental Building Blocks Necessary to Educate Future Decision Makers in Marcellus & Utica Shale Gas* — While geologists have attempted to educate people within the Appalachian area of the potentially world changing opportunity to produce clean natural American gas; biologists, naturalists, and environmentalists are heeding warning of the long-lasting negative impact for the area. The current status, as a newly discovered gas region, has companies from around the world offering policy-makers and regulators the promise of economic and financial gain, yet government officials and the general public lack the knowledge to make informed decisions. This presentation will be a direct result of a prepared bibliography pointing to the fundamental building blocks that our decision makers of tomorrow will need to make educated choices about the future of Marcellus and Utica Shale Gas. The goal of this presentation is to frame the essential content knowledge areas so educators have a basic framework to incorporate discipline specific material into the curriculum so individuals affected will possess the appropriate tools and knowledge to make informed decisions on the future of our region. (2)

Barna, Laura* and **Tammy Tintjer.** King's College, Wilkes-Barre, PA 18711. *Longitudinal Study of Foraging Preferences of Castor canadensis in a Leatherleaf-sedge Wetland Habitat* — This experiment focuses on the foraging preferences of *Castor canadensis* (North American beaver) over a two-year period in a newly formed wetland habitat in a leatherleaf-sedge wetland. *C. canadensis* can drastically alter the biotic and abiotic environment surrounding its habitat to better suit its need of protection and food supply. Depending on the distance from the main habitat and the availability of preferred food sources, *C. canadensis* may select a particular species of tree that best suits its requirements for engineering its habitat and a substantive food source. To explore foraging preferences, this experiment analyzes, over a two-year period, the tree felling activity of a newly established beaver pair. Permanent plots surrounding the beaver habitat were established and within each the woody and herbaceous vegetation foraging preferences were analyzed every three months. It was determined that the preferred tree was *Amelanchier laevis* (Alleghany serviceberry) within 10 meters of the primary habitat. However, in the second year, it was seen that *C. canadensis* both traveled up to 20 meters from the primary habitat to obtain food and felled an increasing number of *Acer*

rubrum (Red maple). An analysis of the foraging preferences of *C. canadensis* can provide a better understanding of how the species selects its environment, how environments suit the species best for habitat formation, and how the species affects community structure. (57)

Barnes, K.B.* and **T.L. Master.** East Stroudsburg University, Department of Biological Sciences, East Stroudsburg, PA 18301. *Using Louisiana Waterthrush (Parkesia motacilla) and Insect Biodiversity to Gauge Productivity in Two Hemlock Habitats in Northeastern Pennsylvania* — Eastern Hemlock (*Tsuga canadensis*) trees are declining as a result of the introduced insect pest, the Hemlock Woolly Adelgid (*Adelges tsugae*). The threat of losing hemlock habitat and its unique biodiversity has become a concern due to ineffective and costly pest control methods. We compared the biological productivity of two hemlock habitats; headwater ravines with steep gradients and fast flowing streams, and benches where streams meander across flat floodplains. Previous studies indicate the Louisiana Waterthrush (*Parkesia motacilla*) to be a robust bioindicator of headwater stream ecological integrity. We quantified waterthrush reproductive metrics, foraging behavior, and habitat use on all occupied territories (n=25) to compare productivity among two bench and two ravines sites. Insect diversity and abundance data were collected in order to investigate potential correlation between insect abundance peaks and nesting activity periods. It was found that mayflies, stoneflies, and caddisflies, collectively known as EPT and favored by waterthrushes, dominated the insect taxa on all streams. The insect phenology data indicates peaks of EPT abundances at various time intervals which may suggest a correlation with peaks in waterthrush nesting activity. Louisiana Waterthrush breeding densities were greater on bench sites than ravine sites but the differences were not significant. A total of 30 waterthrush nests were found on all streams; 10 out of 30 nests were impacted by predation with high predation on both ravine sites (n=8). Research will continue in 2013 on insect-nesting relationships, foraging behavior, and reproductive success. (98)

Barren, Gregory* and **Jessica L. Schedlbauer.** West Chester University, West Chester, PA 19383. *The Effects of Prescribed Fire and Environmental Variation on Soil Respiration in the Serpentine Barrens of Southeastern Pennsylvania* — Serpentine barrens are a threatened ecosystem found throughout southeastern Pennsylvania. These ecosystems are host to rare and endemic species, and are threatened by succession to forest due to fire suppression. Conservationists are now prescribing fire in an attempt to mimic the natural disturbance regime and mitigate forest encroachment. The aim of this study was to investigate how prescribed burns affect ecosystem function, and specifically to determine whether this management activity has a significant impact on how carbon moves through serpentine barren ecosystems. To answer this question, soil respiration rates were measured at six serpentine barren sites, of which three were burned and three

were unburned, in June, July, and August 2012. Environmental variables and 0-5 cm soil organic matter (SOM) content were also measured at each site. There was no significant difference in carbon dioxide (CO₂) efflux rates between burned and unburned serpentine barren sites; however, burned sites did consistently have higher average efflux rates. The lack of significance in this relationship was likely due to the lapse of time (4-5 yr) between burns and CO₂ efflux measurements. The higher average efflux rate was probably attributable to significantly higher SOM, promoting microbial activity, found in soils subject to prescribed fire relative to unburned serpentine barren soils. The variables that best predicted soil respiration rates each month were climate dependent; they were plant biomass and soil moisture in June, soil moisture and soil temperature in July, and biomass in August. The similarity of soil respiration rates between burned and unburned serpentine barrens reveals that prescribed fire appears to be maintaining ecosystem function and is effectively conserving this rare ecosystem. (88)

artle, Sarah R.*, **Pablo R. Delis**, and **Walter E. Mesha-ka Jr.** Shippensburg University, Shippensburg, PA 17257. *Morphometrics, Demographics, and Movements of Marbled Salamanders, Ambystoma opacum, in South Central Pennsylvania*—Little information is available about Marbled Salamander (*Ambystoma opacum*) populations in south-central Pennsylvania. Mass migrations to breeding sites offer an opportunity to estimate population and migration patterns. In 2012 from September to October, we studied a population of Marbled Salamanders migrating to two vernal pools, Missile Pond and North Fence Pond. During dry conditions of early fall, we set a 15-cover standardized grid, at the breeding sites to intercept approaching individuals. Biweekly, we hand captured, sexed, measured, noted direction of approach, cohort marked, and released individuals on site. Missile Pond contained 5.5 times more salamanders than Fence Pond. From the samplings, we captured 259 total individuals, 14.67% females, an approximate ratio of 5.6:1 male biased at Missile Pond. We captured 46 total individuals, 6.5% females, with an approximate ratio of 14.3:1 male biased at North Fence Pond. Males were on average 56.6 mm in SVL, while females were 62.9 mm average SVL, with females being 11.1% larger at Missile Pond. At Fence Pond, males were in average 59.9 mm in SVL, while females were 66.0 mm in SVL, with females being 10.1% larger. At Missile Pond, Salamanders seemed to approach the site from an east direction with 60.8% of all individuals. Numbers of salamanders at sites are indicative of a robust population. Larger numbers of adults migrating to Missile Pond suggests better ecological conditions. Larger female size is consistent with prior studies. There is a bias towards males in the sex ratio with 6.43 times more males than females. The migration from the eastern mountain suggests that the majority of salamanders spend the non-breeding season at higher elevation. (165)

Baylor, Jessica*, **Ayari Diaz-Kelly***, **Katie King*** and **Elaine R. Reynolds**. Lafayette College, Easton, PA 18042. *Altered Sedation but Not Tolerance in a Drosophila Model of Alcoholism*—Scientists use *Drosophila melanogaster* as a model organism for human disorders since they have many common physiological and cellular pathways. In this study, we used *Drosophila* as a model system to study alcoholism. Flies exhibit similar behaviors to humans during alcohol exposure, including motor and social hyperactivity and sedation. Like humans, flies also develop acute and chronic tolerance to repeated alcohol exposure. We examined fly lines from a genome-wide insertion mutagenesis to determine if their genetic alterations alter their sedation kinetics. Twenty-three insert lines that had altered kinetics in a larger screen were compared to a wildtype population. Approximately thirty flies from each line were exposed to 100% ethanol in a chamber, their individual sedation times were recorded, and an average sedation time was calculated and compared to wildtype using a T-test. In addition, several of these lines were reexposed after their recovery and these second sedation times were recorded and compared to the first to determine if each line developed acute tolerance to alcohol. Through this testing, we found that our insert lines showed shorter sedation times and higher sensitivity to alcohol exposure; however, the lines generally retained their ability to develop tolerance to a second alcohol exposure. (46)

Blough, Adam P.* University of Pittsburgh Johnstown. Johnstown PA 15904. *Impact of Coastal Lighting on Nesting Sea Turtles at Jekyll Island GA*—An increasing awareness of the ocean's sea turtles has sparked increased amounts of research to protect these reptiles. In Georgia, coastal protection laws now regulate coastal lighting. The purpose of this project is to examine these impacts on Jekyll Island, GA. Coastal Lighting Protection (CLP) is a study of the buildings and coastal structures that impact their adjacent beaches. If the buildings are not compliant with these new laws, they must implement special measures to limit their damaging impact of the nesting sea turtles on the nearby beaches. This map can now be used to inform the public and building owners of their coastal impact. (93)

Blough, Adam P.* University of Pittsburgh Johnstown, Johnstown, PA 15904. *The Preservation of the Bog Turtle and Their Habitats*—The Bog Turtle (*Glyptemys muhlenbergii*) is the smallest and rarest turtle in North America. The drastic reduction of the bog's population in the past century has acted as a barometer of the overall deteriorating health of our ecosystem. This preliminary research of the history, taxonomy, ecology and behavior of the bog, has introduced this research of habitat conservation. Looking at the Wetlands Reserve Program (WRP,) Pennsylvania Bog Turtle Habitat Restoration Project (PA-BTHR,) and the 2001 Bog Turtle Recovery plan, the overall health of the bog today is examined. Using Remote Sensing and Geographic Information Systems (GIS,) previously identified Bog Turtle habitats

are compared to infrared photography of the eastern United States to identify potential areas for future -or unidentified-bog turtle habitats. This primary research allows for the future study in this field. Continued use of Remote Sensing and GIS, will allow the creation of a more precise map of the bog turtles to greatly ameliorate the restoration efforts of this rare reptile. (173)

Boyd, Matthew* and **Carlos A. Iudica**. Department of Biology, Susquehanna University, Selinsgrove, PA. *Trophic Analysis of a Great-Horned Owl (Bubo virginianus) Diet in Order to Better Regulate Local Mammal Populations* — Small vertebrates make up a large part of the great-horned owls diet (*Bubo virginianus*), and since their skeletons are regurgitated in pellet form, a simple diet analysis can provide a baseline representation of population levels. Combined with climate patterns, this data can help us identify and predict fluctuations in local mammal populations. This information has heavy economic impacts because *Microtus* and other small vertebrates regularly cause damage to crop plots for human consumption. Regurgitated pellets from a single great-horned owl in Airlie Center, Virginia were collected and analyzed for number of species, number of individuals (male/female/juvenile), and lengths of the most identifiable bones (crania, mandibles, femora, tibiae, and coxal bones). This data was used to create an assay of the local mammal population. Local climate data from 2010-2012 was used to explain fluctuations in the diet of *Bubo virginianus*, especially in relation to baseline population levels of small vertebrates. We predicted that meadow vole (*Microtus pennsylvanicus*) would remain the staple of the owl's diet, especially in seasons with higher average temperatures and more overall precipitation. As *Microtus* populations decline during the winter months, we expect other prey items to be better represented in the owl's diet. Our findings will help contribute to the future of agriculture, since the damage caused by small mammal populations on cash crops can be better regulated by the presence and conservation of raptors. (51)

Bray, Samuel* and **Lawrence Mylin**. Messiah College, Mechanicsburg, PA 17055. *Construction of a Novel System to Analyze Recognition of MHC Class II-Restricted Epitopes by CD4⁺ T Cell Hybridoma Clones in vitro* — The Simian Virus 40 large tumor antigen (SV40 Tag) is an excellent model system for studies in cancer immunology because it is strongly immunogenic, but capable of causing tumors when expressed as a transgene *in vivo* when protected by immune tolerance. The CD8⁺ T cell response to Tag in the C57BL/6 murine system is directed against four well-characterized epitopes. However, the CD4⁺ T cell response in this system remains uncharacterized. Recent work using Tag-specific CD4⁺ hybridoma clones and immune splenocytes to screen a 175 member, overlapping 15-mer peptide library corresponding to the 708 amino acid Tag protein sequence have identified three CD4⁺ epitopes. In order to complement this peptide-based screening system, we are constructing a system in which candidate

epitopes can be amplified by PCR and inserted into a modified pGLO plasmid, forming an amino terminal extension of the green fluorescent protein (GFP). Such plasmids will be transformed into *E. coli*. Induction of the fusion gene with arabinose should fill the bacteria with glowing fusion protein. Incubation of arabinose-induced (glowing) bacteria with cultured murine dendritic cells (BMDCs) results in uptake which is readily observed as the phagocytes also begin to glow; glowing BMDCs containing *E. coli* DH5a expressing unmodified GFP do not stimulate hybridoma clones. Antigen processing should release the epitope peptide from the amino terminus of the fusion protein for presentation to added NFAT-lacZ⁺ CD4⁺ T cell hybridoma clones. This system should provide an excellent complement to the current methods which rely on incubation of MHC class II-positive APCs with synthetic peptides because it more closely resembles *in vivo* presentation. Efforts to generate and test the GFP fusion protein system will be described. The system will initially be tested by inserting the LT529-543 epitope and detecting it with appropriate hybridoma clones. (121)

Brey, Christopher and **Matthew McDonnell***. Marywood University, Scranton, PA 18509. *Characterization of Krüppel-Like Transcription Factor KLF-2 Expression Level in Caenorhabditis elegans Using RT-PCR* — Krüppel-like transcription factors (KLF) are a family of proteins that are universally involved in all aspects and processes of cell metabolics, and more specifically fat metabolism. Excess fat accumulation can lead to pathological conditions that can be linked to several metabolic diseases in humans. We have previously been able to link *Ce-klf-1* and *Ce-klf-3* to misregulation of fat metabolism in *Caenorhabditis elegans*. However, *Ce-klf-2* has not been thoroughly studied. To address *Ce-klf-2* impact on fat storage we are currently examining *Ce-klf-2* expression levels at different developmental stages of *C. elegans* using RT-PCR. Briefly, eggs were extracted from worms and transferred to NGM plates seeded with OP50 bacteria. The eggs were incubated at 20°C for their appropriate time (synchronization) to isolate the eggs in embryos, L1-L4, and adult stages. Total RNA was then extracted and the mRNA was converted to cDNA. The cDNA was amplified using two different primers specific for the *Ce-klf-2*. The ama-1 gene was used as the housekeeping gene. The Ct comparative method was used to determine expression levels. Results will be presented at the conference. (28)

Browning, Johnathan A.* and **Bradley G. Rehnberg**. York College of Pennsylvania, York, PA 17403. *Caching Choices of Rural and Urban Eastern Gray Squirrels (Sciurus carolinensis)* — Eastern gray squirrels (*Sciurus carolinensis*) have adapted to living in areas where they experience little to no human interaction such as wooded areas or in places like a college campus where interactions with humans are common. It may be that their food caching decisions are influenced by a consistent presence of humans. Using acorns from red oak (*Quercus rubra*) and white oak (*Quercus alba*) we tested if

squirrel caching choices on the York College campus were different from those in wooded areas. During October and November, 2013, sets of both acorns were placed at 10 sites on campus and in wooded areas, and observed until 5 caches were performed. Squirrels from wooded areas cached 31 red oak acorns to 19 white oak acorns, whereas campus squirrels cached 32 red oak acorns to 18 white oak acorns. Squirrels on campus have consistent access to a wide variety of food that is not available to the wooded squirrels. Interactions with humans and alternate food sources have not altered squirrel behavior when it comes to caching acorns. As interactions between squirrels and humans continue to increase it seems that squirrels will adjust to humans but maintain a preference for caching red oak acorns even as other options are available. (54)

Bucha, John* and **Jena Hassinger***. Misericordia University, Dallas PA 18612. *Characteristics of Water Quality in Trout Brook Creek, Luzerne County Pennsylvania* — This study is designed to develop a chemical profile of Trout Brook Creek (TBC) as part of a larger ongoing benthic macroinvertebrate study on TBC. Three water samples were collected at four different sites in TBC bimonthly from August to December 2012. Measurement of water temperature, dissolved oxygen, pH, and conductivity were conducted on site. Concentrations of ammonia, nitrate, phosphate and chloride were measured. Dissolved oxygen ranged from 7.13 to 12.77 mg/L, pH ranged from 6.77 to 7.58, phosphate was < 0.143 mg/Lm, nitrate was < 0.73 mg/L, chloride was < 0.483 mg/L, and ammonia was < 0.157. Overall the water quality results were within normal limits at all the collection sites, indicating good water quality at TBC. (38)

Butts, Megan R.* and **Carlos A. Iudica**. Department of Biology, University, Selinsgrove, PA 17870. *A Pictorial Atlas and Key to Identify All Living Pennsylvania Mammal Species Using Hair's Cuticular Scales and Medullar Patterns* — We assembled a pictorial catalogue using dorsal guard hairs of all living Pennsylvanian mammal species, illustrating medullar and scale patterns of three distinct regions on every hair. Medulla preparations were made as wet mounts and viewed on the Zeiss Primo Star Light Microscope. They were photographed with a connected Nikon D90 DSLR camera operated using Camera Control Pro 2.0. Scale pattern preparations were completed on SEM plugs using double sided tape to adhere the hairs and were coated with gold using the Denton Vacuum Sputter Coater Desk II. We obtained digital images of the scale patterns for each species using the JEOL JSM-5910LV Scanning Electron Microscope at SU (Biology). To standardize for color, size, and scale, images were corrected with Adobe Photoshop CS6 Extended 13.0 and Adobe Lightroom 4.2. Comparisons of cuticular scales and medullar patterns of guard hairs using an ad hoc interactive-pictorial key allow for identifying and separating of mammal species. To maximize access and use, we integrated the digital pictorial catalogue into an interactive key on the worldwide web. (53)

Campbell, J.M.* Mercyhurst University, Erie, PA, 16546. *Plant Community Development on a Stone Wall by a Tidal River of Southern Ireland* — A survey of plants inhabiting a 2-km long stone wall bordering lower tidal reaches of the Colligan River at Dungarvan on the southern coast of Ireland was conducted during April and May 2012. The plant community on the wall consisted over 50 species of flowering plants, including species shared in common with adjacent supratidal, salt marsh, and woodland/hedgerow communities. Distinctive botanical elements unique to the wall community included a successional series of lichens, mosses, ferns, grasses, sedges, succulents and herbaceous flowering plants. Development of dense mats of vegetation on the top of the wall was more pronounced on the river/salt marsh side than the upland/street side. Protective canopies of patchy tree/shrub clumps along the wall were associated with more species-rich wall-top plant assemblages. (14)

Casey, Abigail*, **Chelsea Seibert**, **Kathleen Spickard***, **Amanda Walck***, and **Alan Hale**. Cedar Crest College, Allentown, PA 18104. *Growth Response of Non-Resistant and Putative Resistant Hosts to Three Coliphages* — One of the perceived weaknesses of phage therapy is the development of phage-resistant hosts. This transition in the bacterial host from phage-sensitive to phage-resistant can occur very quickly and thus undermine the effectiveness of the phage in dealing with human infections. The goal of this study was to evaluate the response of a single strain of *E. coli* to three bacteriophages (CøSL1, CøSL2, CøMD3), all of which are able to infect the same host species. The primary focus was on the susceptibility of the host over time following infection by individual phage and by all possible combinations of phage. Multiple, 96-hour experiments were conducted using NGMC media (nutrient broth (8 g/L); 0.5% glucose; 10 mM MgSO₄; 4 mM Ca(NO₃)₂). Following the initial exposure to one or more phages, seven distinct cultures of *E. coli*, all of which were presumed to be resistant to their respective phages, were sampled and stored at -80°C; these were used for subsequent experiments. Following exposure to phage(s), the populations of susceptible *E. coli* were decimated within three hours. Resistant forms, however, emerged soon after. The bacterial host's specific response varied depending upon which phage or collection of phages were present. Although resistance to CøSL1 and CøSL2 developed relatively rapidly, *E. coli* had a more difficult time developing resistance to CøMD3, and found it even more challenging with cocktails that included both CøMD3 and CøSL1. This suggests that multiple receptors are targeted by the phages and that CøMD3 may likely attach to a relatively essential receptor. In addition, it was found that the relative tenacity of distinct host populations in terms of retaining their resistance to phage infection varied depending upon the phage at first exposure. (147)

Cauvel, Philip E.* and Richard F. Melka. University of Pittsburgh at Bradford, Bradford, PA 16701. *The Usefulness of Mathematica* — This project develops the usefulness of Mathematica, its computational power and its visualization aspects as they relate to both difference equations and differential equations. We exemplify these aspects for several different models: (a) System of two nonlinear difference equations that model host-parasitical systems in patchy environments. (See p.63, #11, *Mathematical Models In Biology* by Leah Edelstein-Kesher). (b) System of two nonlinear difference equations that model leaf-eating herbivores. (See p.106, #15, *Mathematical Models In Biology* by Leah Edelstein-Kesher). (c) A two dimensional system of differential equations that can be solved exactly but illuminated by using the visualization capabilities of Mathematica. (77)

Choy, Nicholas*, Jingyi Zhang, Jonathan Franks, and Om V. Singh. University of Pittsburgh-Bradford, Bradford, PA, 16701. *Biosynthesis and Toxicity of Gold and Silver Nanoparticles From Cave Microorganisms* — The nanoscale materials have emerged as novel antimicrobial agents owing to the unique chemical and physical properties. Due to unintentional entry of nanoparticles in human and accumulation in environment, the bio-nanotechnology offers eco-friendly processes for the synthesis of stable nanoparticles. We hypothesize that the microorganisms from rare earth habitat will reveal unusual properties of biotechnological implications. The nutrient broth enriched soil, collected from Shenandoah National Park Cave, VA, samples revealed total 18 colonies on nutrient agar plates. The microbial colonies were purified and screened for biosynthesis of extracellular gold (Au) and silver (Ag) nanoparticles (NPs) in liquid culture. Two microorganisms, LC3 and LC4, revealed extracellular biosynthesis of Au and Ag NPs. Both Au and Ag NPs were characterized on UV-Vis spectrophotometer and imaged by SEM and TEM for size determination. The antibacterial activity of both NP types was tested against 20 pathogenic microorganisms. The Ag NPs revealed greater zone of pathogenic inhibition than the Au NPs. We predict that the stable Ag NPs will value in antibacterial therapeutics. The soil microcosm was used for ex-situ toxicity assessment of Ag NPs' revealed retaining most colony types and numbers comparing to the control experiments at various temperatures (4°C, 22°C, 37°C, and 45°C) and pH (2, 4, 6, 8, and 10). (72)

Close, Beau*, Joshua Durphy, Matthew Pekular, and A. Panah. University of Pittsburgh Bradford, PA 16701. *Marcellus Shale: The Truth Behind This Treasure*. — Much information has been released on the Marcellus Shale. Many experts have been voicing their opinions and expressing environmental concerns. Despite the massive surge in media coverage, as well as a seemingly frenzied public interest in the Marcellus Formation and the methods of recovery, little is known about this gas formation and the means to produce it. The Marcellus Formation is carbonaceous black shale formed in the Middle Devonian age, covering two-thirds of

the state of Pennsylvania. Through the technology of horizontal drilling, this new energy horizon is being rediscovered with vigor. This process has allowed production of natural gas to reach production levels significantly higher than conventional wells. Recently, the production of natural gas in the Marcellus regions has created a substantial increase of jobs in Pennsylvania. Natural gas production allows the U.S. to become more energy independent and make the gradual transformation away from dirty fuels such as coal. However, concerns exist over the safety of drilling and hydraulic fracturing in Marcellus. Important facts, economic importance, and new technology will be discussed to show that the production of the Marcellus is sufficient and safe for our population. (10)

Corpus, Larry* and Barbara McCraith. Misericordia University, Dallas, PA 18612. *Initial Survey of Benthic Macroinvertebrates from Trout Brook, Luzerne County, Pennsylvania* — This study is part of an ongoing project to survey selected lotic habitats in the ridge and valley region of northeastern Pennsylvania, with the ultimate purposes of serving as a baseline study in the event of an environmental or anthropogenic episode that may adversely impact stream water quality, and developing a reference collection of benthic organisms used for comparison to other area streams. Trout Brook Creek (TBC) is a 1st to 2nd order stream located 3.5 km SE of Misericordia University near Dallas, PA. Benthic samples were taken once per month, August to December 2012, from four sampling sites within TBC using a kick net, "D" frame net, and round extensible net. Two intensive samples were taken at each site, washed through Tyler sieves and consolidated in 95% ethanol, and fine-sorted in the laboratory using a dissecting microscope. Physiochemical measurements were taken concurrently during benthic sampling, including flow, stream depth and width, temperature, dissolved oxygen, pH, conductivity, phosphate, nitrate, ammonia, and chloride. A total of 4,199 individuals representing 15 orders of benthic macroinvertebrates were collected, including the insect orders Ephemeroptera (4 families), Plecoptera (4 families), Trichoptera (6 families), Coleoptera (2 families), Diptera (5 families), Odonata (3 families), Megaloptera (2 families), Hemiptera (3 families), and Collembola (1 family). Predominant families of insects included the Hydropsychidae (1033 individuals: 25% of total), Chironomidae (978:23%), Ephemerelellidae (522:12%), and Simuliidae (445:11%). Non-insect aquatic invertebrates included the Platyhelminthes (2 families), Mollusca (3 families), Oligochaeta (1 family), Crustacea (2 families), and Hydracarina (1 family). EPT Index was 57%, and the overall Biotic Index was 4.677. Based on the EPT and Biotic Indices, TBC would be categorized as having good water quality. (32)

Coxe, Robert*. Delaware Natural Heritage and Endangered Species Program, Smyrna, DE 19977. *Mapping Horizontal Sea-level Rise Using Vegetation Communities at Little Creek Wildlife Area, Kent County, Delaware* — Vegetation communities are the plant expressions of habitats on the ground

with each species preferring specific conditions. As a result the movement of vegetation communities reflects changes in habitat and can be used to map changes in hydrology and/or salinity over time. Vegetation communities at Little Creek Wildlife Area on the shore of Delaware Bay were surveyed in the field, interpreted, and mapped using historic and current aerial imagery from 1997, 2002, and 2007. Vegetation community maps from each year of imagery were then compared for amount, location, and change of each vegetation community from 1997 to 2002, and 2007. Using the above comparisons it was found that Little Creek Wildlife Area, which totals 4,649 acres (1,881 ha), is losing approximately 0.6 acres (0.2 ha) of land a year to water inundation in the 1997-2002 period and 5.8 acres (2.3 ha) a year in the 2002-2007 period, showing a marked increase. North Atlantic High Salt Marsh increased by 48 acres (19 ha), North Atlantic Low Salt Marsh increased by 514 acres (208 ha), while Reed Tidal Marsh decreased by 248 acres (100 ha) and Irregularly Flooded Eastern Tidal Salt Shrub decreased by 5 acres (2 ha) from 1997 to 2007. At Little Creek Wildlife Area changes observed are most likely the result of *Phragmites* control efforts, impoundment management, incursion of brackish water, and water inundation. (169)

Coxe, Robert*. Delaware Natural Heritage and Endangered Species Program, Smyrna, DE 19977. *Seventy-five Years of Marsh Change in the Gray Farm and Penuel Tracts of Milford Neck Wildlife Area, Kent County, Delaware* — The Gray Farm and Penuel Tracts of Milford Neck Wildlife Area are located near the upper reaches of tidal influence on the Murderkill River. The marshes within these tracts were mapped for vegetation communities using 1937, 2002, 2007, and 2012 aerial imagery and field surveys for current imagery. The maps were then examined for changes during the 1937 to 2012 time period. In seventy-five years, from 1937 to 2012, the marshes along the Murderkill River have converted from fresh marsh to oligohaline marsh in 1937, to a mostly mesohaline marsh to polyhaline marsh in 2012, with very little oligohaline marsh and fresh marsh remaining. In 1937 there were 80 acres (32.4 ha) of fresh marsh, 181 acres (73.2 ha) of oligohaline marsh, 51 acres (20.6 ha) of mesohaline marsh, and 8 acres (3.2 ha) of polyhaline marsh. No Reed Tidal Marsh was present in 1937. In 2012 there were 3 (1.2 ha) acres of fresh marsh, 33 acres (13.4 ha) of oligohaline marsh, 161 acres (65.2 ha) of mesohaline marsh, 90 acres (36.4 ha) of polyhaline marsh and 34 acres (13.8 ha) of Reed Tidal Marsh. Reed Marsh can occur in all marsh types. Water acreage has changed in the marsh, increasing from 21 acres (8.5 ha) in 1937 to 35 acres (14.2 ha) in 2012. (170)

Crimmins, Christopher S.* and Bridgette E. Hagerty. York College of Pennsylvania, York, PA 17403. *The Indirect Effects of Paved Roads on Redback Salamanders (*Plethodon cinereus*) in Spring Valley Park, York County, PA* — While the presence of roads had undoubtedly had an impact on species movement and distribution due to road mortality and traffic

disturbances, the impact of roads on habitat quality is an active area of research. Because of their highly specific habitat requirements, redback salamanders (*Plethodon cinereus*) are extremely sensitive to many anthropogenic impacts, such as habitat loss and fragmentation, resulting in their status as a valuable indicator species. Although previous studies have quantified the impacts of logging roads in heavily forested areas, we were specifically interested in the indirect impacts of paved roads within a multi-use recreational park. We hypothesized that salamander abundance will increase with greater distance from the road due to the differences in abiotic conditions. Between July and September 2012, we walked 20 transects in Spring Valley Park (York County, PA) that were perpendicular to available roads. Between 0m and 80m, we searched seven 5m x 1m plots for salamanders and measured the number of cover objects, leaf litter depth, pH, soil moisture, air temperature, and soil temperatures (surface and 5cm depth). All salamanders were discovered at a minimum of 40m from the road and salamander abundance increased with distance. According to multiple regression analyses, leaf litter and the number of cover objects increased as distance from the road increased, acting as major determining factors for salamander abundance. Available cover appeared to be a better predictor of salamander abundance than other abiotic factors within Spring Valley Park. Our study indicates that paved roads do have an indirect effect on salamander abundance, which suggests that roads within county parks may impact local plant and animal communities. (44)

Croft, Kayla*, Brad E. Engle, and Catherine T. Santai. Wilson College, Chambersburg, PA 17201. *The Efficacy of Vitamin K Supplementation When Administered With or Without Coagulation Factor IX on the Treatment of Hemophilia B in a Mouse Model* — Hemophilia B is a bleeding disorder that varies in severity in which the blood does not clot normally and is missing or lacking the clotting factor IX (FIX). Vitamin K plays an important role in the blood clotting process because it is involved in the biosynthesis of a number of blood coagulation factors such as FIX. The purpose of this research was to determine whether vitamin K supplementation has any therapeutic value when administered with or without coagulation factor IX (FIX) in Hemophilia B mice. There were five groups with five mice per group, C57BL/6J mice (Group 1) and Hemophilia B mice (Groups 2, 3, 4, & 5). The treatment of coagulation FIX and/or vitamin K was given over the course of six weeks. At the end of each week, blood samples were collected from the submandibular vein and the treatment was administered via tail vein injection. Blood samples were then tested for the clotting time by using the Prothrombin Time Test (PTT) and the Activated Partial Thromboplastin Time test (aPTT). (137)

Croushore-Kysor, Thomas* and **J. Michael Campbell**. Mercyhurst University, Erie, PA, 16546. *Comparative Seasonal Analysis of Biofilm and Community Diversity Associated with Invasive Diatom Didymosphenia geminata in the Gunpowder River, Baltimore County, Maryland* — Triplicate samples of periphyton were collected in June and November 2012 from the Gunpowder River below Prettyboy Reservoir in Baltimore County, Maryland. In June, the oligotrophic, invasive, bloom-forming colonial diatom *Didymosphenia geminata* was dominant in all samples, and the colonial diatom *Melosira varians* dominated the samples collected in November. Despite negligible differences in water temperature between the June and November sampling dates (9.5 versus 10.7 °C), dissolved oxygen levels at the sampling sites were dramatically higher in June than November (110 versus 0.1% saturation) attributed to *Didymo* oxygen production in June and anaerobic hypolimnetic discharge from the reservoir (November), respectively. Polysaccharide biofilm development compared in different parts of colonial masses of *Didymosphenia geminata* and *Melosira varians* using alcian blue stain indicated *Didymo* colonies are associated with higher densities of biofilm-associated epiphytic algae. (96)

Cutaiar, Gabrielle* and **André Walther**. Cedar Crest College, Allentown, PA 18104. *Analysis of Protein Interactions Using the Cross and Capture method in Saccharomyces cerevisiae* — Replication Protein A (RPA) is a highly conserved, single-stranded DNA binding protein involved in DNA replication, DNA repair, and telomere maintenance. RPA is phosphorylated in response to DNA damage, and there is evidence suggesting that the phosphorylation state of RPA may regulate its ability to physically interact with a number of proteins involved in DNA replication and repair processes. RPA interacts with cellular helicases such as MCM and Sgs1p, and may interact with the helicase Pif1p. Pif1p in turn directly interacts with telomerase to control telomere growth. To better understand the role of RPA phosphorylation in regulating potential interactions with Pif1p, the Cross and Capture technique was validated to observe physical interactions between RPA and Pif1p in the budding yeast *Saccharomyces cerevisiae*. The Cross and Capture method utilizes genetically tagged yeast strains to detect physical interactions between proteins of interest. *Mata* strains, “prey”, were tagged with a VSV epitope and mated with *Mata* strains, “bait”, which were linked with a six histidine tail that binds tightly to nickel. Protein extracts were incubated with nickel-coated beads to isolate the His-tagged “bait” proteins and any associated prey proteins. Western blot analysis was used to detect the bait protein and to determine whether RPA, the prey strain of interest, interacted with Pif1p. Using this system we have begun to examine how RPA phosphorylation affects physical interactions with Pif1p helicase. (132)

Czarnecki, Greg*. Pennsylvania Department of Conservation and Natural Resources, Harrisburg, PA 17105. *The Wild Resource Conservation Program: A Historical Perspective on 30 Years of Conservation* — In 1982 the Pennsylvania General Assembly passed the Wild Resource Conservation Act, which allowed Pennsylvanians to directly support research and conservation of non-game wildlife and wild plants. Using donations from state income tax refunds, proceeds from the sale of owl and otter license plates, and direct cash donations, the Wild Resource Conservation Program has disbursed more than \$18 million in grants to universities and conservation organizations. More than 1,700 projects have been funded, including the reintroduction of bald eagles, river otters, and osprey; surveys and inventories of rare species; and educational publications, videos, and websites. The Wild Resource Conservation Program has also served a unique role connecting three communities of practice – research, education, and conservation - thereby facilitating the exchange and application of knowledge, data, and ideas. This presentation will look at some of these accomplishments and the crucial role the Wild Resource Conservation Program has played, and will continue to play, in conserving Pennsylvania’s biodiversity. (99)

Diegelman-Parente, Amy*. Mercyhurst University, Mercyhurst, PA 16546. *PPCP’s and the Effects on Aquatic Life* — Chemicals used extensively and intensively in our technological society are currently predicted to have surpassed the 100,000 mark in numbers and depending on their properties, modes, and quantity of use, a large number of these chemicals can reach the environment and have unpredictable but potentially harmful environmental and health impacts. Accurate methods of monitoring the levels of these chemicals, an understanding of their potential to damage natural inhabitants to these waters, and the ability to properly develop a risk assessment strategy are all critical pieces to the maintenance of a healthy aquatic ecosystem that does not pose a threat to human safety. Current research has identified several emerging contaminants in Lake Erie beach waters of Presque Isle State Park, including fluoxetine, triclosan, estradiol, and diuron, as well as the artificial sweetener sucralose. All of these chemicals have been shown to have negative health consequences in organisms from bacteria to humans. For most of these, the levels in the Park approach or exceed levels known to cause harm to aquatic species. We have also demonstrated the ability of these chemicals of concern to have genotoxic (and often synergistic) effects on sentinel species, including *E. coli*. (166)

Diegelman-Parente, Amy, J. Michael Campbell, and Michael J. Gigliotti*. Mercyhurst University, Mercyhurst, PA 16546. *Effects of the Artificial Sweetener Sucralose on the Foraging Behavior of the Yellow Mystery Snail, P. bridgessii* — Artificial sweeteners often have a molecular shape that allows for stimulation of sweet taste-receptors in the mouth yet generally provide minimal caloric value by virtue of their po-

tency and/or inability to be metabolized. Aspartame (Nutra-sweet™) is a modified dipeptide that is 600-times sweeter than sugar but still metabolized by the body. Sucralose (Splenda™) is a trichlorinated variant of sucrose (table sugar) and is not only extremely potent, but is minimally metabolized. This inability to be chemically broken down means many food additives such as sucralose pass through the body and end up contaminating our aquatic ecosystems. While many studies suggest that sucralose has minimal toxicity and negligible bioaccumulation, the ability of these food additives to affect the feeding behavior of aquatic organisms may have significant repercussions on their reproductive fitness. To investigate this hypothesis, a behavioral study on the yellow mystery snail, *P. bidgessii*, has been undertaken. The feeding responses of *P. bidgessii* to varying levels of sucralose concentrations were examined using a 3-point qualitative scale. Sucralose levels used in the study ranged from parts-per-trillion (simulating established environmental levels in the beach waters of Presque Isle Bay), to much higher levels, approximating those found in artificially sweetened consumer beverages. The results of the preliminary experiments will be presented as well as a discussion of future directions of the project. (60)

Diegelman-Parente, Amy, Erin J. Cox* and **Jennifer C. Coulombe***. Mercyhurst University, Mercyhurst, PA 16546. *Overexpression and FPLC-purification of the DNA polymerase from *T. aquaticus** — Systematic evolution of ligands by exponential enrichment (SELEX) is a methodology in biochemistry for identifying nucleic acid sequences capable of adopting a shape that binds a target molecule. The process involves several rounds of the polymerase chain reaction (PCR) to amplify DNA sequences followed by steps that ultimately separate and enrich the population of DNAs with sequences having a high affinity for the target molecule. Four main reagents required for any PCR reaction include: 1 – DNA template, 2 – DNA primers, 3 – dNTPs, and 4 – DNA polymerase. PCR optimization is frequently performed to identify experimental conditions that are optimal for the chosen template and primers. This can be a costly step of the experimental procedures, as commercially available DNA polymerases can range from a few hundred to thousands of dollars. In the proposed research project, we have undertaken the process of overexpressing and purifying the heat-stable DNA polymerase from *Thermus aquaticus*. A plasmid containing the gene for *Taq* DNA polymerase was transformed to BL21(DE3) *E. coli* cells. Cell cultures of these transformed cells were grown to saturation at 37°C and overexpression initiated with the addition of IPTG. The desired *Taq* polymerase was purified from a portion of the cleared lysate using ion-exchange chromatography. PCR activity using a standard template and primers was evaluated using samples of purified and unpurified *Taq* polymerase with comparison to three commercial samples. (159)

Diegelman-Parente, Amy and Juliane E. Harmon*. Mercyhurst University, Mercyhurst, PA 16546. *Detection of DNA Damage in Brown Bullhead Fish from Lake Erie Using Comet Assay* — Presque Isle Bay is shallow freshwater ecosystem located off the coast of Erie, Pennsylvania. Bounded on the north and west sides by a recurved peninsula which is home to Presque Isle State Park, Presque Isle Bay was listed as an Great Lakes Area of Concern (AOC) in 1991 primarily based on observations of external fish tumors on brown bullhead (*Ameiurus nebulosus*) collected from the Bay area. Limited findings on the causative agents for these lesions as well as no evidence that these tumors adversely affect survival, growth, or reproduction of this species of fish have left many questions unanswered two decades later. The comet assay determines a qualitative level of DNA damage from cells obtained from blood or tissue samples. This is accomplished by electrophoresis of whole cells fixed to a microscope slide with subsequent analysis using fluorescence microscopy. The extent of DNA damage is directly proportional to the amount of “tail” seen in the dye-stained DNA comet. In this research project, we have used a comet assay to assess the level of DNA damage within various biological samples isolated from brown bullhead collected within and external to the bay area. While this has not identified the causative agent of DNA damage, it has provided additional information regarding the skin tumors observed on these fish. (95)

Diegelman-Parente, Amy and Gregg A. Robbins-Welty*. Mercyhurst University, Mercyhurst, PA 16546. *Aptamer Development for Sucralose using FLU-MAG SELEX* — Sucralose and many other non-metabolizable food additives, drugs, and consumer personal care products are accumulating to detectable levels in our environment. Traditional analytical instrumentation or antibody-based ELISA assays can quantitatively assess their presence and have been used to report detectable levels of sucralose in Lake Erie. Aptamers are DNA or RNA based molecules that adopt a specific structure that allows for a characteristic function, often the binding of a small molecule. Biosensors based on aptamer sequences thus provide a unique platform for detection of small molecules, generating a response to analyte through a binding-specific conformational change. While aptamers have been developed for many target ligands, none exist for sucralose. SELEX (systematic evolution of ligands by exponential enrichment) is a methodology useful for selecting “winning” sequences – the ability to adopt a shape that binds a target molecule – from a library of possible sequences. The process involves several steps that ultimately separate and enrich the population of DNAs with sequences having a high affinity for sucralose. FLU-MAG SELEX uses two specific modifications to traditional SELEX. Magnetic bead technology (“MAG”) will facilitate separation of mixtures of solu-

tions while fluorescently labeled primers ("FLU") will allow for the quantitative monitoring of DNAs as SELEX proceeds. Winning sequences can then be modified into structure-switching biosensors capable of selective and sensitive detection of sucralose from environmental samples. (61)

Eckenrode, Julia*, **Brian Moyer**, **Maureen A. Levri**, and **Edward P. Levri**. Penn State Altoona, Altoona, PA 16601. *The Effects of Insect and Fungal Damage on Reproduction in Mountain Laurel (*Kalmia latifolia*)* — Parasitism and predation can result in a reduction in fitness in individuals. The purpose of this study was to observe the effects of leaf and floral damage caused by insects and a fungal pathogen (*Cercospora kalmiae*) on the floral and fruits production in individual Mountain laurel (*Kalmia latifolia*) plants. A group of sixteen plants located in the Seminar Forrest near on the Penn State Altoona campus in Altoona, Pennsylvania were included in the study. Five inflorescences from each plant were monitored over six months. Floral and leaf damage subtending each inflorescence were assessed as well as the number of flowers in each inflorescence and the numbers of fruits produced. A preliminary analysis of the data shows that increased damage caused by both insects and fungal disease negatively affects the amount of fruits a given inflorescence is able to produce. (86)

Eiseman, Mark D.* and **Carol C. Loeffler**. Dickinson College, Carlisle, PA, 17013. *Patterns in Hemlock Woolly Adelgid Abundance and Hemlock Growth in Eight Stands in Southcentral Pennsylvania* — The invasive hemlock woolly adelgid (*Adelges tsugae* Annand) is causing variable, often severe damage to eastern hemlock (*Tsuga canadensis* (L) Carrière) stands in part of its range in the eastern United States. This continuing study has monitored the abundance of adelgids, tree condition, new growth, and reproduction in eight hemlock stands in central Pennsylvania over six years. Most adult trees survived the period, but occasional deaths occurred in each of the eight 25 x 25 m plots. Numbers of seedlings and saplings were highly variable among plots, probably reflecting light conditions. The number of adelgids varied significantly among plots and years but was regionally high in 2006-2008 and in winter of 2010-12, suggesting that adelgids do cycle regionally. However, one ridgetop plot had chronically high adelgid populations, even when adelgids declined to their lowest level elsewhere in winter of 2011-2011. New growth of hemlock twigs varied significantly among plots and among years, with a significant plot-year interaction indicating variable temporal patterns in growth. At both the plot level and the individual tree level, correlations of winter adelgid presence with new growth in the same year, in the previous year, or in the following year were often not significant but generally positive when significant, especially in the last three years of the study. Correlations of new growth with crown density or live crown ratio were likewise

usually positive when significant. If results for the ridgetop plot ("Plot 8") are typical for higher elevations, such areas may serve as a reservoir for adelgids during low points in the adelgid population cycle, and releases of natural predators might be most successful at these high elevation sites. (89)

Epstein, Leia C.* and **Amy E. Faivre**. Cedar Crest College, Allentown, PA 18104. *Monitoring Water Chemistry and Invertebrate Diversity in Cedar Creek, Allentown, PA* — As the levels of fertilizers and other pollutants increase in our freshwater systems, there is heightened interest in providing a buffer zone around these waterways. Other methods for enhancing water quality include removing small impoundments from stream systems. A section of Cedar Creek flows through Cedar Beach Park where portions of the stream bank have purposefully been buffered by reduced mowing. A portion of Cedar Creek has also been dammed to form Muhlenberg Lake. There has been some interest in removing the dam, as during the summer the Lake water levels are quite low and the population of water birds, primarily Canadian geese (*Branta canadensis*) increases. This past fall at Cedar Creek we collected water samples and conducted invertebrate surveys on a monthly basis at two unbuffered sites, two buffered sites and at a site above and below the dam. Phosphate and nitrate levels at all sites fell below 1 mg/L. However, there was a significant difference (paired t-test, $p < 0.006$) in nitrate levels above and below the dam, with higher levels above the dam. Invertebrate diversity was measured using the Shannon-Weiner index and declined at all sites from September to November. Invertebrate diversity was slightly higher at the unbuffered sites versus the buffered sites. Invertebrate diversity was higher below the dam than above the dam. Specific macroinvertebrate taxa found in the stream suggest it is a fairly clean waterway. In general we concluded that Cedar Creek as it flows through Cedar Beach Park in Allentown is a healthy stream, but we would like to collect additional data at the sites above and below the dam and in the warmer months. (94)

Erickson, Evelyn T. M.*, and **Laura K. Palmer**. Penn State Altoona, 3000 Ivyside Park, Altoona, PA 16601. *Altered Levels of the Yeast Proteasome Maturation Factor Ump1p Affect the Response of *Saccharomyces cerevisiae* to Volatile Anesthetics* — Volatile anesthetics have been used in modern medicine for over 160 years, but their sites and mechanisms of action remain unknown. While many effects of these agents have been characterized, clear insight into how these effects relate to the physiological state of anesthesia has not been elucidated. Volatile anesthetics affect all cells and tissues tested, including mammalian, plant, bacterial, and yeast cells. In yeast, these drugs arrest cell division in a manner that parallels their actions in mammals. To gain further insight into the cellular activities of these compounds, genes were isolated that, when deleted from the yeast genome, render *Saccharomyces cerevisiae* (yeast) sensitive to the volatile anesthetic isoflurane. Deletion of the gene *UMPI* rendered

cells more sensitive to isoflurane than wild type cells. *UMP1* encodes a chaperone required for maturation of the 20S proteasome complex in yeast. Current work is focused on understanding the role of Ump1 protein in the cell signaling pathway(s) affected by these drugs. This information may be useful in determining the cellular mechanisms affected by anesthetic compounds in yeast, which can provide clues as to how these drugs exert their effects on larger eukaryotes, such as mammals. (138)

Ewing, Sarah^{1*}, Michael Groesch¹, Nicholas Amata¹, and Thomas Corso². ¹Gannon University, Erie, PA 16541, ²Lake Erie College of Osteopathic Medicine, Erie, PA 16508. *Elucidating the Effects of Manganese on Dopaminergic Cell Viability and Dopamine Metabolism* — Exposure to high levels of manganese through mining, welding, ground water or well water or through the use of manganese-containing pesticides can cause accumulation of this essential trace metal in dopaminergic cells of the basal ganglia. This accumulation causes mitochondrial dysfunction, oxidative stress, protein aggregation and other signs of neurotoxicity, which can result in an idiopathic Parkinsonism-like disease. The catecholamine/catecholaldehyde hypothesis suggests disruption of normal dopamine metabolism often triggered by mitochondrial dysfunction or oxidative stress leads to an accumulation of toxic 3, 4-dihydroxyphenylacetaldehyde (DOPAL) and cell death. The objective of this study was to elucidate the effects of manganese on dopaminergic cell viability and dopamine metabolism. The SH-SY5Y dopaminergic cell line was exposed to increasing concentrations of manganese, ranging from 0uM to 1000uM for 36, 48 or 60 hours. Cell viability was determined using a trypan blue exclusion assay. SH-SY5Y cells displayed a significant decrease in viability with increasing concentrations of manganese, but this effect was dependent on time. The presence and relative levels of extracellular monoamine neurotransmitters including dopamine, epinephrine, norepinephrine and serotonin as well as their major metabolites were measured using high performance liquid chromatography (HPLC) with electrochemical detection. Preliminary results suggest a significant decrease in the levels of extracellular dopamine and serotonin in the surrounding media of SH-SY5Y cells exposed to manganese. Future studies will 1) study the mechanism through which manganese exposure alters extracellular levels of dopamine and 2) determine whether or not alterations in the levels of these neurotransmitters contribute to the observed manganese-induced changes in dopaminergic cell viability. Elucidating the relationship between manganese induced changes in dopamine metabolism and the loss of dopaminergic cell viability may contribute to our understanding of manganese's ability to induce idiopathic Parkinsonism-like disease. (27)

Fabie, Joshua E.* and Carolyn F. Mathur. Department of Biological Sciences, York College of Pennsylvania, York, PA 17403. *Factors influencing *Staphylococcus aureus* Nasal Carriage Rate and Antibiotic Resistance Prevalence among College Students: 2007-2012* — Potentially pathogenic *Staphylococcus aureus* (SA) is important in clinical medicine due to its ability to persist within the human respiratory tract and on the skin under certain conditions. In order to understand more about this interaction, an ongoing study of the nasal carriage rates of SA and antibiotic resistance prevalence in college students has been underway since 2007. This report is an update covering data from 2007 through 2012. Nasal swabs were cultured in staphylococcus enrichment broth, and further tested for positive, yellow growth on mannitol-salt agar, and for the presence of coagulase (CPSA if positive) and β -lactamase(in CPSA samples only). Overall, 214/881 (24%) of samples taken were coagulase -positive SA (CPSA), which agrees the prevalence reported in other studies and with our previous reports. Forty-six percent of CPSA carriers were also positive for β -lactamase, indicating high levels antibiotic resistance among these individuals. Males had a higher prevalence of CPSA compared to females, ($p=0.0148$, Fisher exact two-tailed test). CPSA carriers who had regular contact with a health-care environment had higher β -lactamase prevalence compared to non-health care individuals ($p = 0.0051$). However, the actual CPSA carriage rate did not differ in these 2 groups ($p = 0.5614$). In addition, no differences were found comparing gym and non-gym users for CPSA ($p = 0.2376$) and β -lactamase activity ($p = 0.0743$). No seasonal (spring vs. fall) differences in CPSA prevalence ($p=0.5650$) or β -lactamase activity ($p = 0.5650$) were detected. (151)

Faust, Lindsay* and Alan Hale. Cedar Crest College, Allentown, PA 18104. *Analysis of the Resurgence of Bacterial Growth After Phage Infection* — Bacteriophages are viruses that infect and lyse host cells, releasing newly formed phage into the surrounding environment. Although bacterial host populations are frequently decimated by phages, they have demonstrated the ability to return to significant growth; the standard explanation for this growth is that the bacteria have developed resistance to phage infection. An alternative explanation for this is that the phages become altered in some way such that they can no longer infect host cells. The goal of this project was to test these two hypotheses. A 96-well plate reader was used to monitor at 5-minute intervals the growth of *Escherichia coli* in the presence of bacteriophage, CøSL1. Growth curves in replicate ($n=8$) were analyzed for specific parameters. This analysis revealed that the time between the decimation of the host population and the resurgence of bacterial growth is consistently about 3 hours over a broad range of multiplicity of infection (MOI) at the start of each experiment. Samples were taken during the exponential phase of the putative resistant bacteria and then filtered to separate free phage from the host cells. The specific activity of these entities, when joined with the original stock of *E. coli* and

CøSL1, respectively, was measured with the top agar overlay method. As expected, the isolated free phages were successful in lysing the original host; this suggests that the specificity of the phage is not altered during a relatively long exposure to its host. Unexpectedly, however, the putative resistant host was susceptible to infection by the original phage. Data suggest that in the absence of CøSL1 the host population rapidly reverts to its original state of phage-sensitivity; this could be accomplished by modifying the expression of relevant genes (e.g., receptors). Plasticity within bacterial gene expression continues to be a headwind within the realm of phage therapy. (149)

Flanley, Catherine*. East Stroudsburg University, East Stroudsburg, PA 18301. *Prevalence of Toxoplasma gondii in New Jersey Black Bears (Ursus americanus)* — The Centers for Disease Control estimates that over sixty million people in the United States may be infected with *Toxoplasma gondii*. Black bears (*Ursus americanus*) may play a significant role in the spread of toxoplasmosis as an intermediate host. The goal of this study is to analyze past data to current data, provide a reference point for future population management, and to explore the risk and transmission to humans. One hundred, fifty-six serum samples were collected from black bears located in Northern New Jersey in the research trapping and bear harvest seasons of 2012. The serum samples were tested for *Toxoplasma gondii* using an indirect Enzyme-Linked Immunoabsorbant Assay (ELISA) protocol. Antibody prevalence to *Toxoplasma gondii* was 89.1%. Further analysis will be completed concerning differences in antibody prevalence according to age, gender and geographic distribution once the data becomes available from the 2012 bear harvest. Further testing will be conducted on all the serum samples to determine the prevalence of *Borrelia burgdorferi*, the bacterium that causes Lyme disease, as well as *Trichinella spiralis*, the nematode that causes Trichinosis. (120)

Ganger, Mike*, Hannah Smith, Julia Girouard, Beth Bahny, and Sarah Ewing. Gannon University, Erie, PA 16541. *Antheridiogen and Absciscic Acid Influence Conversion and ANII Expression in the Homosporous Fern Ceratopteris richardii* — *Ceratopteris richardii* is a homosporous fern whose gametophytes develop into either males or hermaphrodites. Development of undifferentiated spores into males, a process called induction, is strongly influenced by the presence of antheridiogen, a gibberellin-like hormone secreted by hermaphrodites. The gene *ANII* has been shown to be expressed by males during induction and is therefore implicated as a gene important for male determination. In the absence of antheridiogen spores bias toward hermaphrodites, however the plant hormone abscisic acid (ABA) can override antheridiogen and actually block induction. Males require the continued presence of antheridiogen to remain male, but convert to hermaphrodites with its removal. Conversion was explored in *C. richardii* to determine if ABA affects conversion and if *ANII* expression changes during conversion?

Three-week old males were exposed to several concentrations of ABA: 0µM, 1µM, 10µM, 100µM, and 300µM. Males in low concentrations of ABA were more likely to convert and converted more quickly than those in higher concentrations. While ABA blocks induction during early development, it appears to also inhibit conversion. In a separate experiment, three-week old males were transferred either to media lacking antheridiogen; transferred to media containing only 50µM ABA; or kept with hermaphrodites. After 3 days, RNA was extracted, exposed to DNase, and converted to cDNA. qRT-PCR was used to determine if *ANII* expression changed in response to treatment. *ANII* expression remained high in males transferred to media containing ABA, but dropped significantly in males transferred to media lacking antheridiogen. This suggests that *ANII* is not only important for male development, but also for male maintenance. (17)

Gannon, David*, Kofi Boateng*, and Elaine R. Reynolds. Lafayette College, Easton, PA 18042. *Effects of Dietary Modulation in a Drosophila Epilepsy Model* — The ketogenic diet (KD), which is a high-fat, low-protein, low-carbohydrate diet, has been shown to be effective treatment for refractory epilepsy in humans. In a bang-sensitive (bs) fly model of epilepsy, a similar diet is effective in ameliorating seizure behavior. However it was not clear whether the effect was due to the addition of fat, the reduction in sugar or protein, or a food dilution effect. We have further investigated the role of diet in bs seizure behavior by varying fat levels, the type of sugar, and presence of cornmeal. We raised different bs strains of flies (*easily shocked*, *technical knockout* and *bangsenseless*) on various diets, including the normal diet containing molasses, cornmeal and yeast. Using two behavioral measures, percent paralysis, and mean recovery time, we evaluated their bs phenotype on the different diets. The interaction between diet and seizure behavior is not a simple one. We do not see a correlation between seizure behavior and levels of protein, fat or sugar. We did find that foods without cornmeal showed reduced seizures, especially in *easily shocked* flies. These findings support a hypothesis that specific nutrients rather than overall levels of fat, sugar and protein could control seizures in the KD diet. (47)

Gess, Sean*, Hance Ellington, Matthew Dzialak, Joseph Duchamp, Matthew Lovallo, and Jeffrey Larkin. University of Pittsburgh at Bradford, Bradford, PA 16701; Indiana University of Pennsylvania, Indiana, PA 15705; Hayden-Wing Associates, Laramie, WY 82070, USA; Pennsylvania Game Commission, Harrisburg, PA 17110. *Rest Site Selection by Fishers (Martes pennanti) in the Eastern Deciduous Forest* — Information on fisher (*Martes pennanti*) resource selection in deciduous forests of eastern North America is limited. We studied resting habitat selection in a fisher population that recolonized predominantly deciduous forest in Pennsylvania. We quantified selection by comparing used and randomly selected available sites at two spatial scales: the rest structure and at the rest site (area surrounding rest

structures). We identified 79 rest structures used by 15 fishers. The most common rest sites were live trees with cavities or broken tops (69%) with black cherry (*Prunus serotina*), American beech (*Fagus granifolium*), and sugar maple (*Acer sacchrum*) accounting for nearly 65% of tree use. Standing dead trees with cavities or broken tops accounted for 17% of rest structures. Ground-level structures including burrows, rock piles, and root balls comprised 14% of observations. Trees selected as rest structures were larger in diameter at breast height (DBH; 55.3 ± 14.9 cm) than trees at the center of random sites (28.8 ± 6.8 cm). Relative to random sites, important components of forest surrounding rest structures included structurally complex forest floors (based on coarse woody debris and rocky ground cover), canopy complexity, and diversity of tree condition class. Maintaining resting habitat for fishers in the eastern deciduous forest can be accomplished through management practices that encourage structurally diverse forests, including retention of coarse woody debris, and variation in tree size and condition. (102)

Goodwin, Connie*, Catherine T. Santai, M. Dana Harri-ger, and Brad Stiles. *Purification and Comparative Study of L-Amino Acid Oxidase from Crotalus horridus (Timber Rattlesnake) Venoms* — Recent evidence suggests that L-Amino Acid Oxidase (LAO) is a key enzyme responsible for the antimicrobial properties of some biological fluids, where the enzyme catalyzes the deamination of L-Amino acids producing a hydrogen peroxide byproduct which is toxic to most biological cells. LAO has been found in nearly all snake venoms and the concentration of LAO varies greatly between species and additionally within regional variations of the same species. There has been a concerted effort to define the structure and function of LAO derived from snake venoms with the goal of human disease prevention and treatment. There have been successful purifications of LAO to homogeneity from *Bothrops insularis*, *Pseudechis australis*, and *Bungarus caeruleus*. This research focused on the purification and quantification of LAO derived from captive and wild populations of *Crotalus horridus* (Timber Rattlesnake) that were captured in the same region of the Appalachian Mountains. The concentration of LAO enzyme was appreciably higher in the wild venom samples and indicates that there is a significant difference in overall venom composition between captive and wild populations of the same region. (115)

Guild, Katherine*, Jack R. Holt, and Michael D. Bilger. *Susquehanna University, Selinsgrove, PA 17870. Passive and Active Macroinvertebrate Collection Method Assessment Along Adjacent Reaches of the River* — Macroinvertebrates are significant determinants of stream health based upon their sensitivity to pollution. Our study utilized passive and active methods of macroinvertebrate collection at sites on the upper main stem of the River along a transect line that straddled Byers Island near Shamokin Dam, PA. The collection and identification of these organisms to family classification allowed us to determine pollution tolerance values and other

comparative metrics. The Shannon Diversity and Hilsenhoff Biotic Indices reflected the absence of pollution-intolerant taxa. The percent EPT confirmed our analysis of the indices. Based upon the EPA definition of the strengths and weaknesses for each method, the results of the collection were explained. Overall, the metrics did not highlight one technique over another, but rather supported the practice of using both passive and active collection methods in order to describe the macroinvertebrate community thoroughly. (31)

Hake, B.A.* and A. M. Turner. *Clarion University, Clarion, PA 16214. The Effect of Large Woody Debris Addition on Stream Morphology and Fish Habitat in the Allegheny National Forest* — Riparian habitats provide large woody debris (LWD), which can alter stream morphology, retain organic matter, stabilize stream banks, decrease erosion, and provide fish habitat. Deep pools and undercut banks are critical fish habitat in headwater streams. Due to historical deforestation, streams often lack LWD. Additions of LWD are often performed with the goal of enhancing stream habitat, but the conditions under which these additions are successful are still not well understood. In this study, five streams in the Allegheny National Forest were assessed to determine the effect of LWD on pool formation, stream morphology, trout population structure, and stream bed substrate composition. We hypothesized that LWD addition would increase pool formation, trout habitat and population size, and decrease streambed substrate size. Pre-treatment surveys of the streams were conducted in the summer of 2012 prior to the addition of LWD in January 2013. All streams were separated into two, 300 meter reaches; an unaltered reach and a reach in which LWD was added. A 100 meter buffer zone separated the two reaches in each stream. Wetted width and depth was measured within the flowing water, while bank full width and depth was measured from the apex of each bank. The following parameters were also determined: pool width, length, and depth; LWD length and diameter; fish population size and composition; and stream bed substrate composition. These experimental parameters and stream characteristics will also be assessed in post treatment surveys in the summer of 2013. (30)

Hauer, Christopher*, Elizabeth McGovern*, Olivia Stoken, and Howard P. Whidden. *East Stroudsburg University, East Stroudsburg, PA 18301. Monitoring of Summer Bat Activity and Maternity Colonies in the Delaware Water Gap National Recreation Area* — Since the discovery of white-nose syndrome (WNS) in New York during the winter of 2006-2007, populations of temperate, hibernating bats have experienced severe declines throughout the eastern United States and Canada. A comparison of pre- and post-WNS bat activity can help assess mortality levels and the impacts of WNS on populations. In this study, bat echolocation calls were recorded using AnaBat and AR125 acoustic detectors along a driven transect to assess summer bat activity levels in the Delaware Water Gap National Recreation Area. Recorded calls were analyzed using the program SCAN'R, and species were iden-

tified using SonoBat 3.1.4. In addition, evening emergence counts were conducted at known summer maternity roosts within the park to assess potential declines due to WNS since these roosts were last monitored in 1997-1998. The AR125 detector recorded a significantly greater number of echolocation calls than the AnaBat SD2 detector ($p = 0.004$). We identified *Eptesicus fuscus*, *Lasionycteris noctivagans*, *Lasiurus borealis*, *Lasiurus cinereus*, *Myotis* spp., and *Perimyotis subflavus*, with the majority of calls being *Eptesicus fuscus* and *Lasiurus borealis*. In both 2011 and 2012, echolocation calls were recorded along the entire length of the transect, but several areas were identified as having especially high levels of bat activity and may be priorities for conservation efforts. A maximum of 109 *Myotis lucifugus* were observed during our 2012 emergence counts at the Reformed Church of Bushkill (PA), representing a 95%-98% decline from the 2,500-3,000 individuals that were present in 1997-1998 (pre-WNS). We also documented the replacement of *M. lucifugus* by *E. fuscus* at a roost near Birchenough Pond (NJ). (55)

Higgins, Mary*, Robert A. Kurt, Chun-wai Liew, and Anna Peterson*. Lafayette College, Easton, PA 18042. *Cross-Receptor Desensitization of T Cell and Chemokine Receptors in the T cells of Tumor Bearing Mice* — The purpose of this study was to test for cross-receptor desensitization of T cell receptors (TCRs) and chemokine receptors (CCRs) in the T cells of mice injected with tumor cells from the murine breast cancer cell line 4T1. The presence of tumors results in the production of chemokines, which recruit T cells to the sites of the tumors. It was believed that CCRs would become desensitized after prolonged exposure to the chemokines and that their desensitization would cause the cross-receptor desensitization of the TCRs. To test this, female Balb/c mice were injected with 4T1 tumor cells and sacrificed 28 days later, at which time their lymph nodes were harvested. T cells were isolated using magnetic microbead sorting that selected for CD62L- and CD4+ cells. Functionality of CCRs was assessed using chemotaxis assays and functionality of TCRs was assessed using an interferon-gamma ELISA. The T cells from the lymph nodes of naïve mice were also isolated and served as a negative control. The data from these experiments were used to create a computer model, using the modeling program Vensim, that predicted the test results expected under varying levels of desensitization. Laboratory data showed there was no significant difference between the chemotaxis rates of naïve and tumor-bearing mice. The average amount of IFN-gamma produced by the tumor-bearing mice was also similar to the average amount produced by the naïve mice. These data match the results predicted by the computer model under the condition of no desensitization and thus support the conclusion that neither the CCRs nor the TCRs were desensitized. (124)

Hockenberry, Samantha R.* and Suzanne Boyden. Clarion University of Pennsylvania, Clarion, PA 16214. *Interference to Old-growth Forest Restoration Management by Hayscented Fern (*Dennstaedtia punctilobula*): Assessing the Ecological Impact and Management Response of a Native Species Behaving Invasively* — Pennsylvania's forests have not experienced significant regeneration recently, due to the lack of natural disturbance regimes and deer browse damage to seedlings. Hayscented fern, a native perennial that behaves invasively in forest ecosystems, could be contributing to this problem by competing with seedlings for resources above and below ground, and by modifying soil processes. The main objective of this study was to investigate the interactions between hayscented fern and tree seedlings. We compared seedling richness and abundance, soil decomposition rates, nitrogen availability, and additional abiotic factors in the presence and absence of hayscented fern. Additionally, we compared these relationships in areas with different types of forest management (fire, thinning, and presence or absence of deer) to see how fern might respond to treatments designed to promote regeneration and restore old-growth conditions. Initial results demonstrate that hayscented fern reduced seedling richness and abundance. Areas with hayscented fern had reduced decomposition rates and increased soil pH and soil nitrogen levels. Forest management activities directly affected environmental conditions and modified the role of hayscented fern in the ecosystem. These results provide new evidence that hayscented fern not only interferes directly with tree seedlings, but may alter ecosystem processes and nutrient cycling in forests. (83)

Huey, Samantha* and Alan Hale. Cedar Crest College, Allentown, PA 18104. *The Relative Impact of Bacteriophages CøSL1, CøSL2, and CøMD3 on the Growth of *Escherichia coli** — When different phages have the ability to infect the same host, determining the impact of each on the growth of said host is critical in choosing the most effective phage for phage therapy. In this study, the impact of three phages, CøSL1, CøSL2, and CøMD3, on *Escherichia coli* (C-FCL207) were compared. Key parameters used in this comparison were related to the point at which the host population reached a growth rate of zero and began to decline due to phage activity. The growth of *E. coli* was monitored for ten hours under the following conditions: NGMC media; 37°C; 96-well plate format; replicates ($n=8$ per dilution); 3 dilutions per phage to standardize the 3 phage titers; host density equal for all 3 phages; absorbance readings at 595 nm every 5 minutes. For CøSL1, after an initial rise in the population size of *E. coli*, the loss in number due to phage lysis began to exceed the addition of host progeny. The decline began approximately 1 hour after phage adsorbed to the host cells, and ultimately led to an average decline of 78% of the host population. CøSL2, however, appeared to have a minimal impact on the growth of *E. coli*. At 1.25 hours the balance between the growth of the host population and the loss due to lysis reached a brief

equilibrium, but soon after, *E. coli* continued its upward trend in density. In the case of CøMD3 at the same titer as CøSL1 and CøSL2, there was no evidence of slowing in the growth of the host population during the initial 10 hours. Although CøSL1 demonstrated the ability to rapidly decimate the *E. coli* population, higher titers and/or additional time is needed for CøSL2 and CøMD3 to demonstrate a significant impact on the host populations. (106)

Hughes, Daniel* and **Pablo R. Delis.** Department of Biology, Shippensburg University, Shippensburg, Pennsylvania 17257. *First Case of Myiasis in the Laurent's Whiptail Lizard, Cnemidophorus murinus murinus, by the New World Screwworm, Cochliomyia hominivorax, on the Southern Caribbean Island, Curaçao* — The New World Screwworm, *Cochliomyia hominivorax*, can lay up to four-hundred eggs on exposed wounds and the larvae possess noxious saliva, which stimulates infections and destroys integral tissues. This ectoparasite prefers to feed on living rather than on necrotic tissues. This larval infestation, technically termed myiasis, may cause serious hemorrhages and deteriorate the overall host's health, frequently becoming fatal. By 1982, sterile male fly introductions of *Cochliomyia hominivorax* produced its eradication from the United States, as well as from several countries throughout the New World. On Curaçao, however, myiasis eradication efforts have proven to be unsuccessful. Myiasis in reptiles is rare, yet some cases have been described. For instance, infections have been reported in Italy on the Greek Tortoise, *Testudo graeca*, and in the Czech Republic on the Hermann's Tortoise, *Testudo hermanni*. In January 2013, using opportunistic searches of a locality in north-west Curaçao, an adult male Laurent's Whiptail Lizard, *Cnemidophorus m. murinus*, was collected presenting an extensive degree of cutaneous myiasis. cursory examination showed the lizard to be alive, although with clear signs of impaired motor skills. To the best of our knowledge this would be the first report of potentially fatal myiasis amongst Curaçao's reptilian fauna. Accordingly, reptiles on Curaçao may be faced with a potentially lethal parasitic threat associated with old wounds. (45)

Hughes, Daniel F.*, **Pablo R. Delis¹**, and **Walter E. Meshaka Jr.²**. ¹Department of Biology, Shippensburg University, Shippensburg, Pennsylvania 17257. ²Section of Zoology and Botany, State Museum of Pennsylvania, Harrisburg, Pennsylvania 17120. *Snake Assemblage Dynamics of Isolated Artificial Wetlands in South-central Pennsylvania: Implications for Wetland Management and Conservation* — This study examined the ecology and natural history of the snake assemblage occupying artificial wetlands within a matrix of deciduous forest at Letterkenny Army Depot (LEAD), Franklin County, south-central Pennsylvania. This U.S. Army base contains a variety of artificial protected wetlands that are analogous to other sites across Pennsylvania. Monthly, fifty-four standardized cover boards and opportunistic searches were employed from April to October, 2012, across four wet-

lands. Five species were detected with the Common Garter Snake (*Thamnophis sirtalis*) being the dominant and ubiquitous species, followed by the Northern Water Snake (*Nerodia sipedon*). Four individuals of the Eastern Milk Snake (*Lampropeltis triangulum*) were captured, while only a single individual each of the Eastern Racer (*Coluber constrictor*) and the Ringneck Snake (*Diadophis punctatus*) were captured. The Eastern Rat Snake (*Scotophis alleghaniensis*) and the Eastern Ribbon Snake (*Thamnophis sauritus*), among several species historically known in this region, were not detected in this study. Snakes exhibited a bimodal seasonal activity pattern with most captures occurring in June and August. Sex ratio slightly varied among species but showed a female-bias in the Common Garter and the Northern Water Snakes. Ninety-two percent of water snakes were captured at cover boards contiguous to the water's edge. Seventy percent of garter snakes exhibited internal temperatures ranging from 20-30 C°. Snake assemblages at LEAD's artificial wetlands seem comparable to those of other natural wetlands in south-central Pennsylvania. The creation and proper management of artificial wetlands in forested environments can be an effective tool in the conservation of Pennsylvania snakes. (110)

Hughes, Ryan* and **Megan Rothenberger.** Lafayette College, Easton, PA 18045. *Survey of Macroinvertebrate Communities as Biological Indicators of Water Quality Utilized for Assessing the Effects of Dam Removal Along the Bushkill Creek in Easton, Pennsylvania* — Interest in dam removal as a means of river restoration has been gaining momentum nationwide, particularly in Pennsylvania, the state that leads the nation in the number of dam removals. It is important that future dam removal plans include both pre-removal monitoring and extensive follow-up studies to better understand the ecological impact of this type of disturbance. The City of Easton along with the Nurture Nature Center and American Rivers submitted a proposal under the federal "2010 Open Rivers Initiative" for the design of several dam removals along the Bushkill Creek, to be completed in 2013. Monitoring studies of macroinvertebrate composition above and below dams in relation to environmental parameters can provide insight into the biological impact of dam removal. Macroinvertebrates provide a beneficial model for assessing ecosystem responses to removal of small (≤ 5 m height) dams. Macroinvertebrates also play an important role in stream ecosystem function and are relatively easy to collect, identify, and quantify. The objective of this research is threefold: 1) sample macroinvertebrates at five dam sites above, between, and below 3rd and 13th Streets before dam removal, (2) use bioindices to assess and compare water quality at these sites, and (3) analyze compositional variation in macroinvertebrate taxa using ordination. Data collection began in July 2010 and is ongoing. Analysis of these preliminary data has indicated that dissolved oxygen, macroinvertebrate species richness and biodiversity, and disturbance-sensitive taxa are significantly more abundant in the shallow, high velocity waters of the sites below the dams.

After restoration of the natural flow regime following dam removal, environmental conditions and macroinvertebrate species composition and biodiversity of formerly impounded regions of the Bushkill Creek are expected to be more similar to the current macroinvertebrate communities below the dams. (64)

Karanfilian, Briette* and **Michael W. Butler.** Lafayette College, Easton, PA 18042. *Biliverdin: Presence and Potential Applications Sturnus vulgaris* — This study investigates development of quantification methods of biliverdin levels in *Sturnus vulgaris* (European starlings). When senescent erythrocytes rupture, hemoglobin is released and subsequently ingested by immune cells, specifically macrophages, within the bone marrow, the spleen, and the liver. Heme oxygenase catalyzes the release of iron from the heme of the hemoglobin and the remaining protoporphyrin ring of heme is split, resulting in biliverdin. In certain organisms, and *in vitro*, the presence of biliverdin reductase subsequently converts biliverdin to bilirubin, which reverts to biliverdin when oxidized. Biliverdin is a blue-green, tetrapyrrolic pigment that is responsible for the pigmentation of bile and eggshells in many bird species. Biliverdin also has some antioxidant and anti-complement properties *in vitro*, which suggests that it may have important roles in modulating oxidative damage or immune function *in vivo*. Thus, the blue-green pigmentation that appears in eggs may be a result of active deposition of biliverdin, allowing high-quality females to signal their superior antioxidant capacity or immunocompetence to mates, thus increasing paternal care. Quantifying circulating levels of biliverdin would enable studies that investigate how immune challenges and oxidative stress affect biliverdin levels, and the physiological role biliverdin plays in modulating individual responses to these stressors. Blood, bile, liver, and spleen tissue samples were collected from starlings in eastern Pennsylvania and analyzed for biliverdin. Multiple extraction techniques were tested, and optimal extraction methodologies varied by tissue type. Extracted samples were re-suspended and biliverdin levels were quantified using high performance liquid chromatography (HPLC). A more thorough understanding of the presence and production of biliverdin in birds will help to define the physiological and sexual signaling-related benefits, the mechanisms by which these benefits arise, and how they offset the physiological costs. (50)

Kelly Steelman*, Alexander Zawacki, and Ahmed Lachhab. Susquehanna University, Selinsgrove, PA 17870. *Application of Different Resolutions GPR Surveys to Identify Unmarked Graves at The Sharon Lutheran Church, Selinsgrove, PA* — Ground-Penetrating Radar (GPR) is a helpful tool in determining the existence of unmarked graves. Sharon Lutheran Cemetery, located in Selinsgrove, PA, dates back to 1738 has missing graves and has no records or information. Multiple graves have shifted, been covered with soil, or have become lost completely throughout time. Two GPR surveys

were performed to identify the location of the graves. The first survey, completed in April, 2012 was performed at 50 cm spacing along the same direction in a zigzag order while keeping all transect parallel. The second survey involved a 15 by 15 m grid site of the graveyard where transect lines are spaced by 30 centimeters apart along both directions. This more precise measurement indicates clearly the presence of the unmarked graves in the Cemetery. The large scale survey has determined most of the grave locations but certain graves could not be seen. With the second survey more graves were found in addition to certain details that the large scale could not depict. Evidences of unmarked graves were found, with the first survey yet more precise details were identified through the second survey. (91)

Kimmel, Tiffany*, Laurie F. Caslake, Jasmeen K. Saini and Michael G. Galperin Lafayette College, Easton, PA 18042. *Effects of a Quorum Sensing Inhibitor on Pseudomonad Biofilm Formation in Sandy Soil* — Pseudomonads are known to form strong biofilms and have been shown to reduce the permeability of their soil environments. To form these biofilms, Pseudomonads employ the *las* system, one of two AHL-mediated quorum sensing circuits. We were interested in analyzing the effects of a known quorum sensing inhibitor, (Z)-4-Bromo-5-(bromomethylene)-2(5H)-furanone, on the development of soil biofilms. *Pseudomonas fluorescens* strain MIC102 was grown in acrylic rigid containers containing Ottawa 50-70, a fine-grained silica sand, with and without the inhibitor present. Permeability tests were performed using a constant head permeameter and sand samples were observed using confocal microscopy. By day 10, sand injected with *P. fluorescens* strain MIC102L was shown to reduce the permeability of the sand environment to 54% of the original value. No reduction in permeability was observed in the sand containing bacteria and the quorum sensing inhibitor. These results indicate that the furanone quorum sensing inhibitor is effective in limiting biofilm formation in a soil environment. The results obtained give further insight into the role quorum sensing plays in the ability of MIC102L to form a biofilm in sandy soil. The observed increase in soil permeability opens up interesting future applications for situations where biofilm growth in soil is unfavorable. (119)

Kinley, Rachael*, Laura F. Altfeld, and Edward Wells. Wilson College, Chambersburg, PA 17201. *Analyzing the Effectiveness of Neodymium as a Shark Deterrent in the Pelagic Longline Fishing Industry to Reduce the Bycatch of Pelagic Shark Species* — Shark populations are rapidly declining such that finding ways to reduce shark bycatch in the pelagic longline fishing industry (PLL) has become a priority. Electropositive metals have been shown to deter sharks from fishing gear because of the interaction between the electropositive cations released by these metals when they are placed in seawater and the electronegative skin of a shark. The highly sensitive electroreceptive ampullae of Lorenzini is an organ that is only possessed by sharks, rays, and skates that is

overstimulated by the measurable voltage created during this reaction. In this experiment, the voltage created when neodymium is placed in seawater was measured in a simulated lab setting. Voltages were measured for 48 hours in 1 centimeter increments from the source. In addition, the interaction between neodymium and wild shark species was tested in the field during fishing trials using three line types; a line containing neodymium, a sham control, and a true control. In the lab, voltage decreased over time and distance. The maximum voltage produced by the reaction was 0.4 V DC. The results of the field trials are inconclusive because no sharks were captured although a variety of other fish species were caught on all line types suggesting that neodymium has no deterring effect on PLL fishing target species. (97)

Klemow, Kenneth M.* Institute for Energy & Environmental Research, Wilkes University, Wilkes-Barre, PA 18766. *Translating Scientific Findings into Public Understanding of Shale Gas Issues: Challenges and Potential Solutions* — Shale gas development through hydraulic fracturing (fracking) has become a contentious debate within the past five years. Proponents assert that the natural gas obtained through the process can provide a significant source of energy to the United States – and worldwide – for decades. Opponents are concerned that hydrofracturing techniques pose a threat to groundwater, surface water, human health, and the atmosphere. Since much of the debate centers on risks that can be evaluated by scientific research, one can argue that sound science, well-explained to various stakeholders, can inform public opinion and lead to consensus. Unfortunately, public reaction to scientific studies on the risks of groundwater contamination and fugitive emissions of greenhouse gases has led to more polarization. Rather than objectively viewing the strengths and weaknesses of emerging research, proponents and critics of the shale gas industry often view new studies through the lens of personal bias. Studies that produce results that run counter to expectations are routinely dismissed outright, often through personal attacks on the credibility of the scientists performing the research. A survey of twelve individuals identified as opinion-leaders (six pro- and six anti-) in late summer 2012 found that all read at least some primary scientific articles on topics of concern. Ten of the twelve believed that scientists adjust their findings to reflect the interests of their funding sources, denoting a fundamental mistrust of the scientific community. Thus, translating scientific findings into public understanding requires scientists and educators to overcome bias and mistrust among target stakeholders. Strategies for addressing those challenges, including the use of citizen science and translational approaches to research will be discussed. (1)

Knepper, Aneshia*, Laura F. Altfeld, Deborah S. Austin, and Brad E. Engle. Wilson College, Chambersburg, PA 17201. *Familial Grouping of Female *Odocoileus virginianus* in a Hunted Environment* — This study seeks to determine the ability of female *Odocoileus virginianus* to form familial

groups with the pressures of hunting. Three herds were investigated, a hunted group, a group on a game preserve, and a captive deer herd. Familial groupings were evaluated using mitochondrial DNA (mtDNA), and sex was determined using the sex determining SRY gene. Feces were collected and DNA was extracted from the feces. The extracted DNA was then magnified using polymerase chain reaction (PCR) with two different sets of primers to cut both the SRY and mtDNA. The mtDNA was then exposed to restriction enzymes in order to further cut the DNA into smaller segments, stained with ethidium bromide, then electrophoresed in gels and imaged. Presence of a band in SRY gels indicated a male sample. Similar banding in mtDNA indicated familial grouping. Both males and females were present among the collected samples in all herds. Similar patterns were observed in the mtDNA, which indicated that familial grouping was occurring in the hunted herd. (59)

Knoll, Lesley B.*¹, Jennifer A. Brentrup², Craig E. Williamson², and Bruce R. Hargreaves³. ¹Lacawac Sanctuary Biological Field Station, Lake Ariel, PA, ²Miami University, Oxford, OH, ³Lehigh University, Bethlehem, PA. *Automated Profiling Buoy for Exploring Lakes as Sentinels of Change: ARTHUR at Lake Lacawac* — Automated lake sensor systems are becoming more common with technological advances. These systems allow scientists to decipher ecological changes and patterns and are especially powerful when integrated into ecological observatory networks (EON's). EON's are increasing in number, membership, and importance as scientists address questions at broad spatial scales. EON's and sensors are also ideal for understanding the responses of lakes to weather events and climate change. We recently developed a novel Aquatic Resource Tool for High-Frequency Underwater Research (ARTHUR). This unit is a small, portable, profiling buoy equipped with a suite of biological, physical, and chemical sensors. ARTHUR was developed for small lakes and uses an innovative winch system that incorporates wireless technology. ARTHUR data enables us to examine weather and climate driven impacts on lake dynamics. In 2012 ARTHUR was deployed in Lake Lacawac, a mesotrophic lake in NE Pennsylvania within Lacawac Sanctuary. Data show that fluorescence sensors often over estimate chlorophyll values during the day due to non-photochemical quenching so night profiles are valuable to correct for this phenomenon. Onset and progression of stratification and deep chlorophyll layers were clearly visible. Data from ARTHUR as well as opportunities to learn more about sensors are available at Lacawac Sanctuary. (168)

Kohlbrenner, Emily* and Steve James. Biology Department, Gettysburg College, Gettysburg, PA. *Generation of New *snxA*^{Hrb1} Alleles by a Non-complementation Assay* — We are studying the recently isolated *snxA* gene (suppressor-of-*nimX*^{cdc2}) in the fungus *Aspergillus nidulans*. *nimX*^{cdc2} encodes the catalytic subunit of CDK1, the canonical cdc2-cyclinB kinase whose activation in late G2 phase trig-

gers entry into mitosis. *snx1*, isolated as an extragenic suppressor of *nimX2*^{F223L}, suppresses the heat-sensitive G2 arrest of *nimX2* and permits mitosis to occur at the restrictive temperature of 42°C. *snx1* alone also confers a cold-sensitive arrest in G1 at 22°C or below. *snxA* encodes the *A. nidulans* ortholog of *Saccharomyces cerevisiae* Hrb1/Gbp2, nonessential shuttling mRNA binding proteins belonging to the SR (Serine-Arginine Rich) and RRM (RNA Recognition Motif) protein family. These proteins were not previously known as regulators of cell division. Deletion of *snxA* phenocopies *snx1* by conferring cold-sensitivity and suppressing *nimX2*, albeit with a more severe, growth-impaired phenotype than *snx1*. Also, we have determined that the *snx1* mutation lies outside the coding region and most likely is in a proximal element such as enhancer that makes it difficult to identify. Together, these findings suggest that (1) *snx1* is likely to be a hypomorphic mutation resulting from diminished levels of the wild-type protein, and (2) at normal levels, *snxA* acts to restrain cell division. In order to learn more about this novel mechanism for controlling cell proliferation, we have used a non-complementation strategy to isolate 10 new candidate *snxA* mutations. We are using linkage analysis, complementation testing, and DNA sequencing to verify *bona fide* *snxA* alleles and to identify the mutations in each. Given its apparent role to inhibit mitosis, and the occurrence of *snxA* homologs in mammals, we are interested to understand what role these homologs may play in diseases of unrestrained cell division, *i.e.*, cancer. (131)

Kohut, Byron*, Patrick Gerity, and Debra Williams. Westmoreland County Community College, Youngwood, PA 15697. *Creating a High-Impact, Multi-State Alliance Transforming Communities for Economic Growth* — Westmoreland County Community College (WCCC) developed ShaleNET, a systematic, recruitment, training, placement, and retention model specifically for the Natural Gas and Oil industry. Strategic, national, alignment with WIBs, One-Stops, industry, and training providers, development of an online talent matching system, and a uniform training/certification program creating career pathways demonstrates the achievements of a high-impact nonprofit institution of higher learning. The result is the implementation of a program aimed at educating interested individuals in a fast moving industry while highlighting the necessary qualifications and skill sets required to enter the natural gas industry. ShaleNET addresses the critical issues of current institutional gaps, projected institutional gaps, actions on behalf of students, and actions on behalf of the community. Specifically, ShaleNET focuses on creating a new vision of national education, internal/external partnerships, connections with WFD/industry, teaching to fit the need, use of technology, stronger community relations, employability skills, continuous dialog, regional partnerships, understanding and telling the CC/economic development story, and collaboration with business partners. As evidenced by the momentum and successful strategies

established through ShaleNET and the development of a web-based recruitment and placement system, ShaleNET has attracted over 12,000 visitors seeking information, training, and placement within the natural gas, shale, and oil industry. The objective of ShaleNET is to link communities and its residents with employment opportunities and education and training programs in the newly emerging and already booming natural gas, shale, and oil industry. The ShaleNET team implemented a standardized, stackable system of workforce solutions, certificates, and associate degrees that are recognized by the natural gas and oil industry. (3)

Komar, Hannah* and Manuel Ospina-Giraldo. Lafayette College, Easton, PA 18042. *Comparative Expression Analysis of Phytophthora sojae Polysaccharide Lyase Family 3 Genes During Infection of the Soybean Glycine max* — *Phytophthora sojae* is one of the most important and destructive agricultural pathogens known today. Despite its prevalence, relatively little is known about the specific genetic and enzymatic components involved in host (soybean) cell penetration. To initiate infection, *P. sojae* must first break through the plant cell wall using a specialized structure known as appressorium. Cell penetration is also likely aided by enzymatic activities that target the plant cell wall. Termed CAZymes, these enzymes are able to degrade or modify the structural carbohydrates of the soybean cell wall. One subset of CAZymes, the polysaccharide lyases (PL), has been hypothesized to play an important role in the process of host cell penetration through polysaccharide degradation mechanisms. To investigate this hypothesis, relative expression of genes within family 3 of the polysaccharide lyases was quantified over a 48-hour time period during the course of infection. Such analyses have revealed changes in the rate of expression of these genes throughout infection, providing further evidence as to the involvement of the PL family 3 gene products in penetration of the host cell wall. (105)

Korpics, Samantha*, Laura Mascibroda, Amber Green*, and Amy J. Reese. Cedar Crest College, Allentown PA 18104. *Investigation into of the Levels and Roles of Alpha-1,3-Glucanase of Cryptococcus neoformans* — *Cryptococcus neoformans* is a fungus that can cause lung or central nervous system infections in immunocompromised individuals. The primary virulence factor of *C. neoformans* is its polysaccharide capsule, which protects the cell from the human immune system. The capsule is attached to *C. neoformans* via cell wall alpha-1,3-glucan. This research focuses on the four alpha-1,3-glucanase enzymes of *C. neoformans*, which are thought to break down and remodel cell wall alpha-1,3-glucan, as this process might be necessary for budding. Other fungal organisms only have one or two alpha-1,3-glucanase genes. The overall goal of this research is to better understand the role(s) of alpha-1,3-glucanases in cryptococcal capsule binding and regulation. One aim of this project is to overexpress the full length and putative catalytic domains (referred to as truncated versions) of the al-

pha-1,3-glucanases in a yeast expression system (*Kluyveromyces lactis*, pKLAC-2). If cryptococcal cell treatment with expressed glucanases can interrupt capsule binding, the administration of this enzyme could have potential therapeutic applications. Complete and truncated versions of the genes have been cloned. Currently, work is underway to put these clones into the pKLAC-2 vector. A second aim of this project is to use quantitative real time polymerase chain to evaluate the natural expression levels of each of the four genes in different conditions. If we understand the expression levels of the four genes, we may better be able to predict which alpha-1,3-glucanase enzyme(s) may be available to play a role in the remodeling of alpha-1,3-glucan during cell growth. Alpha-1,3-glucan is not present in human cells, so this is a potentially attractive future antifungal drug target. The drugs currently available to treat fungal infections are often harsh on patients and there is much need for new drugs, drug targets, and drug approaches. (144)

Kory, William*. University of Pittsburgh at Johnstown, Johnstown, PA 15904. *Geography – Bridging the Social and Natural Science* — In most colleges, Geography is listed as a social science discipline. Geographers, however, also engage in the study of diastrophic and hydrospheric forces which shape and transform our earth. These physical geography topics are considered to be natural sciences which provide a link with demography, geopolitics, urbanization and other fields in geography which fall under the social science category. The focus of this presentation will be on a variety of physical and social sub-topics of geography and on their relationships. Some of the examples will include the way in which diastrophic forces change and reshape the urban settings, the effect of climate change on human behavior, and the leaching factor on agricultural production in the tropical regions. More examples will be provided and discussed at the session. (172)

Krebs, Chelsea*, **M. Dana Harriger¹**, **Deborah S. Austin¹**, and **Julie Skaife²**. ¹Wilson College, Chambersburg, PA 17201. ²Select Breeders Services, Chesapeake City, MD 21915. *Comparative Analysis of Viability Assays for Evaluation of Post-thaw Equine Spermatozoa* — The US equine industry has a \$102 billion annual economic impact. Breeding for and maintaining characteristics of breeds and familial lines have spurred research in viability and assessment assays to complement research in cryopreservation. Cryopreservation maintains genetic breeding lines of renowned stallions through long term storage as well as reproductive potential of these lines through artificial insemination. A key predictor of insemination success is post-thaw spermatozoa viability. This research compared three viability techniques on post-thaw equine spermatozoa from 6 stallions. Two assays, Trypan Blue and the NucleoCounter, assess viability based on dye exclusion, which is indicative of cell membrane integrity. The third assay, MTT reduction, assesses mitochondrial activity, indicative of viability. The results suggest that the dye

exclusion assays are comparable while the values from the MTT assay were consistently higher for viability in comparison. These results suggest that although an efficient method to assess viability, the MTT assay may provide misleading values since the results indicate metabolically viable cells regardless of any cellular damage. With regard to dye exclusion, Trypan Blue is a cost effective, reproducible assay that provides consistently reliable values for determination of equine spermatozoa viability. (67)

Krebs, Jordan *, **Andrew Gale**, and **Jeff Newman**. Lycoming College, Williamsport, PA 17701. *Purification of Flexirubin Pigments from *Chryseobacterium** — Many species within the *Flavobacteriaceae*, *Cytophagaceae*, and *Chitinophagaceae* families of the *Bacteroidetes* contain flexirubins, a modestly studied class of pigments. The purification and structural determination of flexirubins has already been completed for 5 species: *Chitinophaga filiformis* Fx e1, *Flavobacterium* sp. strain C ½, *Flavobacterium* sp. strain Samoa, *Flavobacterium johnsoniae* Cy j1, and an unrelated sulfur-reducing bacterium, *Sulfurospirillum delayianum* 5175. As shown by 42 elucidated structures, these pigments have 5 possible structural variations. In this study, the purification of flexirubins from *Chryseobacterium oranimense* has been optimized. Initial acetone extraction of pigments from *Chryseobacterium oranimense* DSM 24030 was prepared in methanol for preparative separation of related flexirubin pigments by silica gel column chromatography. Preparative fractions have been purified utilizing reversed phase high performance liquid chromatography (HPLC) for subsequent structural determination using spectroscopic methods. Additional flexirubin structures from more diverse bacterial species may aid in understanding the function and biosynthesis of these pigments. (117)

Krebs, Jordan, Andrew Gale*, **Tom Sontag**, and **Jeff Newman**. Lycoming College, Williamsport, PA, 17701. *Average-Nucleotide Identity Protein-coding (ANIpc): Novel Genomic-Based Method to Differentiate Bacterial Species* — The definition of bacterial species has been based on DNA-DNA hybridization (DDH) for over half a century. Average nucleotide identity (ANI) has been shown to correlate well to DDH and has been suggested as a replacement metric. Calculations of ANI using the MUMmer algorithm (ANIm) have been used to differentiate microbial species, however MUMmer does not run on Windows computers. Average nucleotide identity protein coding (ANIpc) is based on pairwise comparisons of orthologous genes by the web-based tool, Rapid Annotation Using Subsystems Technology (RAST) and analysis using Microsoft Excel Macros. ANIpc was compared to ANIm, ANI BLAST (ANIB), tetranucleotide frequency correlation coefficients (TETRA), DDH, 16s rRNA, and multi-locus sequence analysis (MLSA) values. The correlation of ANIpc to DDH was equivalent to ANIm. (161)

Kropf, Matthew M.* University of Pittsburgh at Bradford, Bradford, PA 16701. *Innovations and future direction of Hydraulic Fracturing Proppants* — As hydraulic fracturing technology is applied to an increasing diversity of producing formations, the development of specialized proppants is advancing. Several desirable characteristics are now being engineered into proppant specifications including increased fracture resistance, high degree of particle size selection, and the dynamic and chemical properties creating activated functionalities. This presentation will review recent advances in proppant technologies and discuss the potential for activated proppants for increased reservoir production and reduced material waste. (8)

Kunch, Alexa* and **Meda Higa.** York College of Pennsylvania, York, PA 17403. *A Method for Determining the Involvement of Glycoprotein G_N in Hantavirus-Host Cell Binding* — Hantaviruses are in the family *Bunyaviridae* and the genus *Hantavirus*. The Hantavirus genome contains three negatively stranded RNA segments, known as the Small (S), Medium (M), and Large (L) segments. The virus can be carried by rodents and transferred to humans through aerosolized droppings, causing HHaHantavirus Pulmonary Syndrome (HPS) and Hemorrhagic Fever with Renal Syndrome (HFRS), which can lead to death. Hantavirus receptor binding and cell fusion is facilitated by the transmembrane glycoproteins G_N and G_C . However, the specific role of G_N in virus-host interactions remains unclear. To determine the contribution of the intraviral, C-terminal tail of G_N in virus infection, we wanted to introduce the Hantavirus glycoproteins into a reporter gene-containing pseudovirion system that would allow for a single round of replication in a host cell. This system was preferable because classic approaches for studying Hantavirus infection are time-consuming and unsafe to carry out at the undergraduate level. We first designed and cloned a truncated G_N construct that we could introduce into our pseudovirion system. This required an unconventional cloning strategy because G_N and G_C must first be expressed as a single protein and then post-translationally cleaved. Briefly, two separate constructs were created; a G_N fragment with the intraviral domain removed and a G_C fragment containing an internal cleavage site. An overlap PCR was performed to recombine the truncated G_N and the G_C fragments. The completed glycoprotein construct is expressed and incorporated into the pseudovirion, followed by infection of host cells. Assessment of infection with pseudovirions containing truncated and wild-type glycoproteins will help to elucidate the role of G_N in host-cell binding and infection. (146)

Latario, Luke*, Fred J. Brenner, E. C. Vroegindewey, Megan Osborne, Michelle Peck, Richard Toth, Maire Casey, Stacey Senter, and Kaitlyn Bailey. Grove City College, Grove City PA, 16127. *Use of DNA Fingerprinting to Determine the Breeding Patterns of Urban and Rural White-tailed Deer Herds* — DNA fingerprinting of short tandem repeats in nuclear DNA from white-tailed deer (*Odocoileus virginianus*)

was investigated as a means of determining breeding patterns within urban and rural deer herds in Ohio and Pennsylvania. Liver tissue samples were obtained from three metroparks in Dayton, Ohio and Presque Isle State Park in Pennsylvania. Nuclear DNA was isolated from liver tissue and nine fluorescently labeled primers for DNA were selected and confirmed as effective for use in polymerase chain reactions to amplify the short tandem repeats of nuclear deer DNA. Products of PCR reactions were then confirmed using gel electrophoresis in 2% agarose gel and photographed under UV light using a Bio-Rad imaging unit. Successful PCR products were then analyzed using an Applied Bio Systems 310 single capillary automatic DNA sequencer with GeneScan software to accurately measure STR length. This process was used to create a unique DNA “fingerprint” of each deer based on the STR size and frequency, a procedure analogous to forensic identification of human DNA. Although previous studies on mtDNA indicated that maternal lineages occur in these urban population, nuclear DNA fingerprinting displayed heterozygosity suggesting a lack of inbreeding and that bucks move in and out of the different herds. Further and more exhaustive study will be used to determine more clearly paternal genetic history and infer the breeding behavior among urban and rural white-tailed deer herds. (58)

Laubach, Larry L.* and John Becker. East Stroudsburg University, East Stroudsburg, PA 18301. *Occurrence of Intraerythrocytic Parasites in Chrysemys picta, Chelydra serpentina, Sternotherus odoratus, and Trachemys scripta Within Pennsylvania and New Jersey* — Intraerythrocytic chelonian parasites of the Eucoccidiorida order have been found in turtle species throughout much of North America. Leeches of the genus *Placobdella* have been identified as an alternate host and vector for many of these parasites. It has been shown that different turtle species have differing rates of infection due to their susceptibility to leech parasitism. In the late summer/fall of 2012 we collected blood samples from 268 turtles representing four species; *Chrysemys picta* and *Trachemys scripta*, basking species; and *Chelydra serpentina* and *Sternotherus odoratus*, non-basking species. Turtles were trapped in hoop traps or fish and crab traps baited with sardines, from ponds and lakes. Seven locations were selected for sampling; four from eastern Pennsylvania and three from western New Jersey. Blood smears were made within 6 hours of collection and were fixed in methanol and stained with Giemsa. Slides were examined under 1000x oil immersion. Twenty fields of view (FOV) were examined. If a parasite was observed, the mean number of cells per FOV was determined for that smear and a parasitemia estimate was made. Parasitemia was characterized as being low, moderate, or heavy. There was no significant difference for parasitemia and prevalence levels between locations. There was a significant difference in both parasitemia and prevalence between basking and non-basking species. (111)

Leone, Jerry*. Casella Waste Systems, Inc. 1879 Rte. 5 & 20, Stanley, NY 14561. *A Centralized Approach for Managing E&P Wastewater* — The Pennsylvania oil and gas industry produces hundreds of millions of gallons of flowback water, brine, and produced water each year. With limited local solutions available, this material is often transported by tanker truck over long distances to out-of-state deep injection wells. The CARES water treatment, recycling, and disposal (TRD) facility, located in Sergeant Township near Mt Jewett, has been built to provide a safe, reliable, cost-effective, and local treatment solution for water from drilling activity in northern Pennsylvania. The new CARES facility employs a unique water treatment technology called AltelaRain®. Designed after nature's process for making rain, the system operates at low temperatures and uses low-grade steam. The resulting clean distilled water product can be returned to the environment, or recycled back to drillers, reducing demands on local freshwater. The AltelaRain® Modules are made from polypropylene plastic which eliminates risk of fouling or scaling. Fueled by landfill gas from the adjacent McKean County Landfill, the low temperature and low pressure system means higher efficiency at lower treatment cost thereby reducing costs and putting a wasted resource to beneficial use. The CARES facility serves Oil & Gas operators as well as oil service companies that haul water for disposal. The CARES facility is capable of treating 500,000 gallons per day for suspended solids and 100,000 gallons per day for dissolved solids. (5)

Lerch, Elizabeth*, Jennifer Flack*, and Marlene Cross. Mercyhurst University, Erie, PA 16546. *Efficacy of Meristem-Tip Culture and Thermotherapy for OYDV and LYSV in Garlic (*Allium sativum*)* — A number of viruses infect cultivated garlic (*Allium sativum*) today; two of the most prevalent are the *Potyvirus* Onion Yellow Dwarf Virus (OYDV) and Leek Yellow Stripe Virus (LYSV). These viruses decrease the crop yield and cause discoloration and stunting of the garlic leaves. Due to the nature of garlic's reproduction via vegetative propagation, viruses remain in the garlic tissues from generation to generation. There has been some controversy over the use of thermotherapy in addition to meristem-tip culture in eliminating these viruses. A preliminary DAS-ELISA virus screening was done, and 45 Georgian Crystal bulbs, positive for both OYDV and LYSV, were chosen with the assumption that if one clove of a bulb was positive for the virus, all of the cloves in that bulb would be positive for the virus. The remaining 110 cloves from these bulbs were randomly put into five different treatments: 30-day heat thermotherapy, 40-day heat thermotherapy, 50-day heat thermotherapy, 125-day cold therapy, and a control group. After treatment, each clove went through meristem-tip culture. They were then placed in Gamborg's B-5 media with IBA and grown for five weeks. Leaf tissue from each culture was then tested for both OYDV and LYSV. The results showed that the meristem-tip culture was very

effective in eliminating OYDV, regardless of the treatment that the clove underwent. However, in the case of LYSV, a hot thermotherapy in addition to meristem-tip culture was the most effective for eliminating the virus. The efficacy of cold treatment is also being assessed. (69)

Levitsky, Josh*, Seth Young, and Heather Sahli. Shippensburg University, Shippensburg, PA 17257. *Different Methods of Crop Covering Used to Extend the Spring Growing Season In South Central Pennsylvania* — Growing spring and summer crops in South Central Pennsylvania is limited by the date of last frost, which is late April. By protecting crops from frost, winds, and cold weather the spring growing season can be started earlier. Covering methods such as hoop houses, wind tunnels, and ground surface covers allow crops to be planted earlier, giving extended time for crops to grow and potentially increasing annual crop yields. However, the cost and labor of covering crops may prevent farmers from using such methods. We compared the crop yield of spinach and lettuce grown under four different cover methods: a hoop house, low plastic wind tunnels, low fabric wind tunnels, and fabric row covers. Yield under each of these cover types was compared to control plots which were not covered. Crops were grown in 24-foot rows at the Shippensburg University Garden with two rows per treatment. For each of the 10 rows the same amount of compost was added before planting and a drip irrigation system was used to guarantee each row received the same amount of water. Data was taken on the effectiveness of each covering method in terms of cost to build and maintain, soil temperature, air temperature, and finally total plant yield. Findings from this work will help growers in South Central Pennsylvania to choose the most cost effective cover method while maximizing crop yield. (80)

Lewis, Randa M.* and Suzanne Boyden. Clarion University of Pennsylvania, Clarion, Pa 16214. *The Effect of Deer and Management on Tree Seedlings and Understory Richness in Pennsylvania Hardwood Forests* — Old growth forests are diverse, valuable, and encompass trees of varying age classes. Pennsylvania houses mainly young and even-aged forests. These forests face an array of obstacles, including a lack of natural disturbances and too many deer. These difficulties ascertain few opportunities for regeneration, so the future of our forests is uncertain. The questions asked in this study were: What impacts are deer having on plant richness and tree regeneration? And can forests be influenced (through silviculture or deer management) to boost regeneration and accelerate the maturation of forests into old growth conditions? The hypotheses are: 1. Deer exclosures will increase the density and richness of forbes and woody plants in the understory, and 2. Through controlled disturbances (specifically burning and thinning) we can increase regeneration. The study is being conducted in Clear Creek State Park. The study area is split into six, 15 acre sites. Three sites are fenced, and three are unfenced. Within each fencing treatment, sites have been treated either with fire, fire plus removal of maple, or left as a

control. We present monitoring data on the understory composition, tree seedlings, and environmental conditions from the season following the treatments. Initial results demonstrate that thinning increased the richness and abundance of plants in the understory, while fencing increased the number of tree seedlings and the average height of the understory. Interestingly, the impact of deer on the understory depended upon the silviculture treatments. These results could help guide management and forest restoration efforts. (87)

Liberti, Maria* and **Robert Kurt.** Lafayette College, Easton, PA 18042. *The Damaging Effects of Auranofin on 4T1 Murine Mammary Carcinoma Cells* — Auranofin is a sulfur-containing gold (I) compound that has been widely used for the treatment of rheumatoid arthritis and is known for its anti-inflammatory and immunosuppressive properties. Previous studies have indicated that auranofin inhibits activation of the NF- κ B and JAK1/STAT3 signaling pathways through multiple target proteins and suppression of the transcription factors involved in these pathways. Because cell proliferation in many cancers is mediated by the NF- κ B and JAK1/STAT3 pathways, the biochemical mechanism(s) of auranofin were previously investigated in various tumor cells including multiple myeloma, acute promyelocytic leukemia, and human hepatoma. In each study, there was inhibition of the NF- κ B and STAT3 pathways, as well as induced apoptosis and cell cycle arrest. However, the exact mechanisms by which auranofin exerts its anti-inflammatory and immunosuppressive effects are not yet completely understood. The purpose of this study was to elucidate the effects of auranofin on tumor cells and to determine whether auranofin affects breast cancer cells. This study tested auranofin on 4T1 murine mammary carcinoma cells and found a significant decrease of cell growth in a time- and dose- dependent manner. Despite the decrease in cell number, the viability of the tumor cells remained high, suggesting that auranofin may not be inducing cell death. Initial cell cycle analysis by flow cytometry showed a depletion of cells in the G2 phase and an accumulation of cells in the G1 and S phases, indicating that auranofin may induce cell cycle arrest at the S phase. These results suggest that auranofin does impact growth of breast cancer. Current studies are aimed at determining whether auranofin inhibits 4T1 breast cancer cell growth through modulation of cell cycle arrest and/or induction of apoptosis. (126)

Loney, Jeff*, Cameron Markert*, and Josh Sandberg. *Well Plugging and Abandonment – the Appalachian Basin* — The purpose of this discussion is to review the methodology behind effective and secure abandonment of oil and natural gas wells within the Appalachian Basin. As land is procured for future industry development, such as shale gas, older fields are being decommissioned. With approximately 75,000 wells drilled in New York State and 355,000 wells drilled in Pennsylvania, the topic begs particular attention. The information being presented is based upon the experience of The Palmerton Group, LLC, a consulting firm active-

ly involved in abandonment operations within the Appalachian Basin. The company manages lease decommissioning and reclamation, including the plugging of wells of varying types, depths, ages, and locations. It has managed the plugging of over 930 shallow oil and gas wells for a major operator since 2005, gaining a unique view into the complexities of plugging and abandonment within one of the country's oldest oil fields. The abandonment of oil and gas wells provides protection to the environment and population from materials associated with the drilling, stimulation, and production of hydrocarbons. When left unattended, a well's integrity deteriorates, allowing the potential communication of strata. Wells are plugged through strategic placement of non-porous materials within the wellbore. These materials are positioned over producing strata and surface casing bottom to prevent the influx and communication of formation fluids. Alternative plugging methods, such as the deployment of wire-line-conveyed mechanical plugs, are implemented in wells with special conditions or challenges. With deliberate efforts to responsibly negotiate their stewardships, operators within the Appalachian Basin relieve themselves of future liability, improve general public opinion, and promote communal safety. With the ongoing development and refinement of the industry, increased public scrutiny and industrial innovation will advance techniques further and further forward in a more safe and responsible manner. (9)

Luu, Larissa*, Kimberley McGrath*, and Tammy C. Tobin. Susquehanna University, Selinsgrove, PA 17870. *Isolation of Actinomycetes from Hot Soils Overlying the Centralia, PA Mine Fire* — In 1962, a mine fire began in Centralia, Pennsylvania when a trash fire ignited a surface coal seam and spread throughout the mineshafts below the town. The fire has created a stable, hot soil environment that is ideal for the study of thermophilic soil microorganisms, such as actinomycetes. Actinomycetes are Gram-positive, aerobic, filamentous bacteria that are capable of producing secondary metabolites such as antibiotics. Finding new antibiotics is required to counter the increasing number of antibiotic resistant pathogens that are evolving. In order to identify novel actinomycetes that may, in turn, be producing new antibiotics, surface soil samples were collected from fire-affected and unaffected soils and DNA was extracted from the samples. The 16S rRNA genes were amplified from the extracted DNA using PCR with universal domain Bacteria primers. Metagenomic analysis will be performed on these amplified fragments to characterize the resident bacterial communities. To isolate potential actinomycetes, soil samples were used to inoculate yeast glycerol agar, oatmeal agar and humic-vitamin agar media. Simple, Gram, and endospore staining was conducted to further characterize the bacterial isolates. Bacterial growth was observed only on the yeast glycerol agar medium and staining revealed that the samples contained

both Gram-positive, filamentous bacteria and Gram-negative, rod-shaped bacteria that produce endospores. Suspected actinomycete isolates will be identified using 16S rRNA gene sequencing, and novel isolates will be tested to determine if they are producing antimicrobial compounds. (74)

Lyons, Monica*, Brad E. Engle, and Deborah S. Austin, Wilson College, Chambersburg, PA 17201. *Metal Absorption in Ulothrix zonata (Chlorophyta, Ulthraciases) from Sediment Contaminated with Acid Mine Drainage* — Acid mine drainage is an environmental quality issue for many states including Pennsylvania. There are several methods for remediation of acid mine drainage from streams; however, these methods can be quite expensive. Research indicates that the addition and growth of algae can aid in the remediation of the contaminated water and sediment. Studies have determined the amount of iron(III), zinc(II), aluminum(III), and manganese(II) ions select algae can absorb from water, but not the quantity of these metal ions absorbed from sediment. *Ulothrix zonata*, an acid tolerant algae, was utilized in this study to determine the amount of iron(III) and zinc(II) ions that can be absorbed from sediment contaminated with acid mine drainage over a period of four weeks. An atomic absorption spectrophotometer will be used for quantification. It is anticipated that *Ulothrix* will reduce the concentration of iron(III) and zinc(II) ions in the sediment thus facilitating the remediation of the stream. (29)

Mahoney, Chelsea*, Michaela Ortiz, Kayla Hager, and André Walther. Cedar Crest College, Allentown, PA 18104. *Identification of Phosphorylation Dependent Interactions Between Replication Protein A and Cellular Proteins in Saccharomyces cerevisiae* — Replication Protein A (RPA) is a highly conserved, single stranded DNA binding protein involved in DNA replication, repair, and recombination in all eukaryotes. RPA is composed of three subunits: RPA1, RPA2 and RPA3 and physically interacts with a number of proteins involved in cellular processes that work with DNA. RPA is phosphorylated in a cell cycle-dependent manner and in response to DNA damage. Our lab developed mutant strains of *Saccharomyces cerevisiae* with mutations at serines and threonines of RPA2 that can be phosphorylated. To test whether the phosphorylation state of RPA regulates protein-protein interactions, the target serine and threonine residues were mutated to aspartic acids to mimic a constitutively phosphorylated form of RPA, or to alanine to mimic a constitutively unphosphorylated form. We used Yeast Two Hybrid utilizing GAL4 DNA binding domain fusions with each of the subunits of RPA, as well as mutated phosphorylated forms of RPA, and a cDNA library of yeast proteins fused to the GAL4 activating domain. In our initial screen, we have identified ~170 candidates that interact with the constitutively phosphorylated form of RPA. We have tested these candidates for false positive interactions caused by autoactivation, and have begun the process of characterizing interactions with the unphosphorylated form of RPA. Our preliminary results

have identified several candidates that interact with the phosphorylated form of RPA but not the unphosphorylated form indicating that the phosphorylation state of RPA can regulate RPA-protein interactions, which suggests that phosphorylation plays an important role in regulating the complex RPA functions in the cell. (22)

Manes, Chelsea* and Jeramia Ory. King's College, Wilkes-Barre, PA 18711. *Exploring the Role of CUF1 in Phagocytosis of C. neoformans var neoformans* — *Cryptococcus neoformans* is an opportunistic fungal pathogen in humans that is especially infectious and harmful to immunocompromised individuals. Virulence of *C. neoformans* is attributed to both the yeast's ability to synthesize and express the pigment melanin and its ability to evade phagocytosis by alveolar macrophages through a protective polysaccharide capsule. *C. neoformans* exhibits a reliance on copper homeostasis for both virulence and general fitness, making the copper import pathway of particular interest to our lab. Cuf1p is the copper sensing transcription factor vital to this pathway. Recent studies have shown that in *var grubii* (common name H99) strains of *C. neoformans* where the Cuf1p transcription factor has been knocked-out, there are elevated rates of phagocytosis in comparison to the wild-type. The objective of this study is to investigate phagocytosis evasion of CUF1 knockout strains of the *C. neoformans* var *neoformans* (common name JEC21) compared to wild type. We and others have shown that Dcuf1 JEC21 exhibits more a severe fitness phenotype in low copper conditions than the Dcuf1 H99 strain. Whole genome expression analysis of the Dcuf1 JEC21 strain shows many genes related to cell wall biosynthesis and capsule production are differentially regulated compared to wild type. For these reasons, we hypothesize that the Dcuf1 JEC21 strain may be phagocytized by macrophages to a greater degree than seen for the Dcuf1 H99 strain. Genome expression analysis and phagocytosis of Dcuf1 compared to wild type JEC21 will be presented. (145)

Mantero, Patricia*, Sarah Landis, Brittany Smith, Elissa Colledge, Alyssa, Byrd, and Edward P. Levri. Penn State Altoona, Altoona, PA 16601. *The Effect of Light Intensity on the Photokinetic Behavior of the New Zealand Mud Snail (Potamopyrgus antipodarum)* — The New Zealand mud snail is known to exhibit a positive photokinetic response (it moves faster in the light than in the dark). However, it is not known if the response is a threshold response (it takes a certain amount of light to initiate the change in behavior) or if the response changes gradually with increasing light intensity. The purpose of this experiment was to determine if an intermediate light intensity results in an intermediate photokinetic behavioral response of the snails. Snails were placed in behavioral chambers and allowed to move outward for seven minutes under one of three light regimes: no light,

ambient sunlight, and 50% ambient sunlight. Following each trial the snails were collected and separated based on whether they had travelled more than 8 cm. A preliminary analysis of the data suggests that intermediate light intensity results in an intermediate response. (41)

Marold, Russell* and **A. Panah.** The University of Pittsburgh at Bradford, 300 Campus Drive, Bradford, PA 16701. *Fracking Up a Storm* — United States has very large reserves of shale gas deposits that were developed in 27 basins in the United States millions of years ago. Extraction of natural gas from shale is not an easy task but with advances in horizontal drilling technology and fracture stimulation technologies, production becomes economically feasible. Fracture stimulation is needed because most shale gas deposits are too tight to allow natural gas to flow freely up the wellbore on its own in economically feasible quantities. The most popular method currently used in horizontal drilling is hydraulic fracturing but this technology has created enormous unsolved environmental issues. In areas with water scarcity the technology is more costly due to freshwater scarcity. So what if the gas could be extracted in a liquids-free fracking in an environmentally friendly manner where both sides of the argument can be happy? This is where alternative methods of fracture stimulation such as “Dry Frac.” come into play. Dry Frac uses liquid CO₂ as the carrier fluid without water or any additional treatment additives. Dry fracking takes either highly pressurized liquid propane or liquid nitrogen/carbon dioxide in acidized media injected down the well for fracturing. This massive fracturing technology does not use near as much water or sand as conventional hydraulic fracturing technique and then it could be the next big revolution in well stimulation. Parallel to Air Fracking, companies are looking to better their traditional hydraulic fracking technology using environmental friendly frac-fluids in hydraulic fracturing using environmental-friendly additives in minimum quantity. Will this new and improved fracture stimulation technology help the United States to become energy self-sufficient in the near future, till we develop long-lasting, clean renewable energy technology in the Country? (11)

Mast, Jesse* and **Bradley Rehnberg.** York College of Pennsylvania, York, PA 17403. *The Correlation Between Maternal Pre-natal Diet and Blood Leptin Levels of Adult Offspring in CD-1 Mice* — In a previous study, we determined that maternal pre-natal diet correlates to differences in body weight. A high sugar diet correlates to higher body weights in male and female adult offspring, and a high fat diet correlates to a higher body weight in adult female offspring. Leptin has been implicated as an indicator of obesity in humans, and is correlated with appetite and feeding behaviors as well as whole-body yellow adipose tissue. Eight pregnant female mice were fed one of 4 diets: high fat, high sugar, high fat and high sugar, or control throughout their 21-day pregnancies. After birth, all mothers and weaned pups were fed the control diet. At 21 days of age, the pups were weaned and separated

by gender and housed with their siblings of the same sex. When the pups reached 3 months of age, they were weighed and euthanized. Blood was collected, and the serum was extracted and stored in -20°C. An ELISA assay will be used to quantify the amount of leptin in the blood samples. A difference in leptin levels would point to a potential mechanism for the development of higher body weights through its influence on feeding behavior and appetite. (135)

Mastria, Michael*, Camila Moscoso, and Laurie Caslake. Lafayette College, Easton, PA 18042. *Analysis of Desert Crust Isolates for the Gene Encoding Bleomycin Resistance* — The drying of cells results in damage to cellular structures — the plasma membrane, cellular proteins, and nucleic acids. To survive, desiccation-tolerant cells must possess a complex array of repair mechanisms — principal among these is the capacity to repair accumulated DNA fragmentation and prevent protein oxidation. If desiccation survival invokes a generalized repair strategy, then one might expect that organisms isolated from the crust would have the capacity to repair, or be resistant to, DNA damage no matter the source. Previously, bacterial isolates from the desert crust were exposed to bleomycin, which promotes the formation of free radicals that cause double-strand breaks in the DNA — several desert crust isolates were as good or better than *Deinococcus radiodurans* at repairing DNA damage caused by bleomycin exposure. The goal of this study was to determine the possible presence of bleomycin resistance gene in these desert crust isolates. We designed primers to known genes that confer bleomycin resistance and multiple polymerase chain reactions were completed for each of the strains tested. The three strains of bacteria include *Bosea*-related OP-290, *Methylobacterium*-related OR302-10, and *Patulibacter americanus* CP153-3. DNA products were isolated for each strain; most of the PCR products were under 200 base pairs, smaller than the expected size. Sequence analysis of the PCR products is underway and results will be presented. (75)

Matthews, Stephen*, Ronald Kaltreider, and Bradley Rehnberg. York College of Pennsylvania, York, PA 17403. *Presence and Identification of HSP70 in the Fall Webworm Caterpillar; Hyphantria cunea (Lepidoptera:Arctiidae)* — *H. cunea* are capable of withstanding temperatures that differ greatly from their optimum temperature, while maintaining stationary in their web. Many links between thermoregulation and Heat shock protein 70 (HSP70) have been identified. The results of this study will provide data aimed towards understanding the methods behind the thermoregulation in *H. cunea*. This study was conducted by subjecting *H. cunea* to elevated temperatures up to 46°C, in a controlled environment to possibly induce the HSP70 expression. We are hypothesizing that there will be a presence of HSP70 in the fall webworm, which will be related to temperature in a direct fashion, increasing in concentration as the temperature increases. The levels of HSP70 will be analyzed through a western blot analysis using monoclonal HSP70 antibodies. As a control

the experiment will be conducted with the Gypsy Moth (*Lymantria dispar*), which is a less thermotolerant ectotherm. Using this control our data should additionally indicate that *H. cunea* have elevated concentrations of HSP70 in their bodies. (68)

McKean, Lauren*, Jen Simmon, and Amy J. Reese. Cedar Crest College, Allentown PA 18104. *Phenotypic Characterization of Environmental Rhodotorula Fungal Strains* — Fungi that can cause fungal infections are found in the everyday environment. While some infections are mild, other fungi can cause serious pulmonary and systemic opportunistic infections in those that are immunocompromised. *Cryptococcus* and *Rhodotorula* species are yeast-like fungi that cause these types of infections. The antifungals available to treat these types of infections are limited and can be harmful to those taking them. Understanding more about the fungi and how they affect the human body can help create better medicines and treatments. The cell integrity of *C. neoformans* has been previously tested, providing useful information on how the fungus functions, since the synthesis of cell walls play a role in survival and virulence. Previous work in our lab suggests that *Rhodotorula* have similarities in cell wall and capsule attachment to *Cryptococcus*. Because of this, we hypothesize that different environmental *Rhodotorula* species will be susceptible to various conditions in a similar manner to environmental *C. neoformans* strains. This research will provide a better understanding of *Rhodotorula*, which in turn can be used to develop new antifungals. (118)

Melka, Richard F. and Hallie L. Kleiner*. University of Pittsburgh at Bradford, Bradford, PA 16701. *Pairwise Comparisons of Professors* — Pairwise ranking seeks to assign values of worth based on a numerical scale to determine criteria and, under such criteria, compare them against each other. It is through the use of matrices and a statistical approach that we are able to obtain weight vectors which describe the comparison of both the criteria and the options. A final weight value is obtained for each option that, essentially, determines which is the best choice with an indication of logical consistency. This method may be applied to analyze the effectiveness of professors in criteria such as ability to convey the subject clearly, sufficient use of examples, and maintain a controlled classroom environment. To minimize bias, data was gathered through surveys distributed to a portion of the student body via classroom visits and, using these surveys, averages on the numerical ranking scale were obtained for each professor in each criteria. This project is based upon the class notes of Dr. Richard F. Melka given in a course on Mathematical Modeling. (76)

Melka, Richard F. and David R. Ware*. University of Pittsburgh at Bradford, Bradford, PA 16701. *Maximizing Long-term Harvests* — Harvesting models are of pedagogical interest in the classroom as they usually involve elementary bifurcation phenomena. We take a different approach to this

topic by allowing for non-constant harvesting rates and by attempting to optimize harvests over fixed time periods. The logistic growth model is used as an example as it allows for significant manipulation while still allowing for elementary analysis. Other models such as the Allee effect or the Gompertz law can be considered as well. Wolfram Mathematica is used throughout as a method of displaying and interpreting calculations and results. (78)

Menaquale, Frank*, Elissa Colledge, Brittany Smith, and Edward P. Levri. Penn State Altoona, Altoona, PA 16601. *The Effect of Crayfish Odor on the Behavior of the Invasive New Zealand Mud Snail (Potamopyrgus antipodarum)* — Detection of predators often elicits a behavioral avoidance response in prey. The purpose of this experiment was to determine if New Zealand mud snails respond behaviorally to the odor of crayfish and to determine if the response varies depending upon snail genotype. A group of 20 snails were placed into 300 ml containers that had untreated tap water. One group of snails was given 2 ml of crayfish scented water in their container while the other group was given 2 ml of distilled water. Over a period of ten minutes the behavior of both groups was recorded in terms of where individuals were in the container. The snails could be found either on the bottom, on the sides, or attached to the surface tension of the water on the top. This experiment included several different clonal genotypes of snails including both clones native to New Zealand as well as clones invasive to North America. A preliminary analysis of the data suggests that at least some clones do recognize the scent of crayfish and alter their behavior, and that some clones respond differently than others. (40)

Metz, Elizabeth*, Christina Lehman*, Megan Radyk*, and Edward P. Levri. Penn State Altoona, Altoona, PA 16601. *The Influence of Fish Odor on the Emergence Time of the Invasive New Zealand Mud Snail (Potamopyrgus antipodarum)* — Animals often use olfactory cues to initiate predator avoidance behaviors. The purpose of this study was to monitor the emergence time from the shell of different clones of the invasive New Zealand mud snail (*Potamopyrgus antipodarum*) in the presence and absence of fish odor. At least 20 snails of each clonal genotype were placed in either plain water or water from a tank that held fish. The time it took for the snail to emerge from its shell and begin moving was recorded. We expected to find that the detection of fish would cause the snails to stay in their shells for a longer time. A preliminary analysis of the data suggests that fish odor does not influence the emergence time of the New Zealand mud snail. (39)

Miller, Joseph*, Maria LoBrutto, and Cosima Wiese. Misericordia University, Dallas, PA. 18612. *Effect of pH on Photosynthesis in the Aquatic Plant Duckweed (Lemna spp.)* — Acid precipitation and acid mine drainage is known to change the pH of aquatic ecosystems, and may be acting as a stressor to aquatic plants. This study investigated the effect of an altered environmental pH on the aquatic plant duckweed

Lemna minor. *L. minor* plants were grown in aerated flasks with a modified Hoagland's solution in an environmental chamber with a 16 hr photoperiod for 14 days. Three replicate samples were allowed to grow in each of three pH levels: pH 4, pH 5.3, and pH 6.5. Reduced biomass, growth rate, and leaf color was observed in pH 4 solutions as compared to pH 5.3 and pH 6.5. Further experimentation to assess plant metabolism encompassed investigation of photosynthetic capacity by quantification of products necessary for successful photosynthesis, including chlorophyll a, chlorophyll b, and Rubisco. The quantity of total chlorophyll was reduced in plants grown in pH 4 and 5.3; however, Rubisco quantity appeared unaffected by plant exposure to acidic conditions. The impacts on chlorophyll quantity are being further analyzed by determining whether changes in gene expression of chlorophyll synthase, the enzyme which catalyzes the final step in chlorophyll a synthesis, may contribute to decreases in total chlorophyll. Additional work is also underway to evaluate whether exposure to acidic conditions increases oxidative stress in the plant, which would result in negative impacts on plant growth and reproduction. (12)

Moran, Deborah*, Trevor Cross, and David Dunbar. Cabrini College, Radnor, PA, 19087. *Proteogenomics-based Refinement of Mycobacteriophage Genomes* — In collaboration with MSBioworks, we have recently used an innovative N-terminal-oriented proteomic (N-TOP) proteomics procedure to identify and quantify the structural proteins that make up the C Cluster mycobacteriophage Ghost structural proteome. C Cluster mycobacteriophages possess myoviral morphotypes with short, contractile tails. Using the N-TOP technique we identified 50 putative Ghost virion proteins that are strong candidates for structural proteins based on their abundance levels, processing patterns and bioinformatics analysis. The N-TOP procedure requires resolving proteins on SDS PAGE gels and performing in-gel protease digestion followed by peptide identification using a mass spectrometric technique. Based on abundance and proteolytic processing data complemented by HHPred analysis we were able to identify several of the identified Ghost proteins as functional homologs to the bacteriophage T4 structural proteins. Another advantage of the N-TOP approach is that it has also allowed us to detect post translational modifications (PTMs) for several identified structural proteins giving additional supporting evidence for their roles in the mature Ghost virion. Other forms of post translational modifications (PTMs) detected at sites for several Ghost structural proteins were phosphorylation and glycosylation events. Phosphorylation sites were detected for four proteins; gp97, gp98, gp126 and gp139. The C terminal residue of gp98 was found to be heavily glycosylated (O-HexNAc). To our knowledge, this is the first evidence of structural protein phosphorylation and glycosylation for bacteriophage structural proteins. (107)

Movsesyan, Ovsanna*, M. Dana Harriger, Laura F. Altfeld, and Catherine T. Santai. Wilson College, Chambersburg, PA 17201. *Analysis on Concentrations of 17 β -Estradiol in African Clawed Frogs (*Xenopus laevis*) Treated with Chloroform and Iodoacetic Acid, Common Endocrine Disrupting Compounds, Resulting from Water Disinfection Procedures* — Water chlorination maintains water quality during distribution, yet it produces disinfection by-products (DBPs), specifically iodoacetic acid and chloroform, characterized as endocrine disrupting compounds (EDCs). Researches show that EDCs have effects on androgen levels, particularly 17 β -Estradiol which is the focus of the research. Female adult African Clawed frogs were exposed to 8 μ g/L iodoacetic acid, 0.21 μ g/L chloroform and a combination of both (8.21 μ g/L) for four weeks. Blood samples were collected weekly via cardiac puncture; plasma was analyzed for 17 β -Estradiol using RP-HPLC. Results are expected to show low concentrations of 17 β -Estradiol, based on the fact that chloroform and iodoform may act as EDCs by targeting the transcription factor of steroid nuclear receptors, activating the estrogen receptor and mimicking natural receptor ligands. Further findings in this area will extend our knowledge of water disinfection and its possible link to hormonal activity that can lead to problems with reproduction and development of the organism. (43)

Moyer, Brian*, Julia Eckenrode, Maureen A. Levri, and Edward P. Levri. Penn State-Altoona, Altoona, PA 16601. *The Influence of Inflorescence Size and Number on the Following Year's Inflorescence Production in Mountain Laurel (*Kalmia latifolia*)* — Trade-offs are predicted between traits that may compete for resources within an individual. Mountain laurel (*Kalmia latifolia*) produces variable numbers of inflorescences and variable numbers of flowers per inflorescence. The purpose of this study was to determine the relationship between the size and number of inflorescences produced in one year to the size or number produced the following year. One hundred twenty-five plants were utilized in the Seminar Forest on the Penn State Altoona campus. The number of inflorescences and the average number of flowers per inflorescence were determined for each plant. This was then compared to the data recorded for the same plants the previous year. A preliminary analysis of the data suggests that increased floral output by a plant the previous year results in a decreased floral production the following year, and smaller floral output the previous year yields a greater floral production the following year. (85)

Mulugeta, Surafel, Eric Clark, Christina Vojtek*, and Steven A. Mauro. Mercyhurst University, Erie, PA. 16546. *The Active Ingredient in Anti-depressants Acts Synergistically with Other Chemicals to Influence Levels of the Fecal Indicator Bacteria *E. coli* in Recreational Freshwaters* — 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 organ-

isms including fish, algae, and crustaceans. However, the impact of fluoxetine on aquatic microbes remain poorly understood. In this study, we utilized ELISA, spectrophotometry, and microbial plating approaches to examine how fluoxetine influences *E. coli* 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 *E. coli* levels through a DNA damage dependent pathway. Moreover, we found that fluoxetine can act synergistically with triclosan, a personal care product chemical also found in Presque Isle beach waters, to reduce *E. coli* concentration. Since *E. coli* is used as an indicator of freshwater quality, the presence of fluoxetine in aquatic ecosystems can influence how water management decisions are made. (63)

Mylin, Lawrence*, Kevin Wile, Daniel Wingert, Chrissie Puchalo, Jeremy Haley, and Todd Schell. Messiah College, Mechanicsburg, PA 17055 and Penn State Hershey College of Medicine, Hershey PA 17033. *Identification and Characterization of Additional H-2^b-restricted T cell Epitopes within the Simian Virus 40 Large Tumor Antigen* — The CD8+ T cell response to the Simian Virus 40 large tumor antigen (SV40 Tag) exhibits a hierarchical response to four distinct MHC class I-restricted determinants (I, II/III, IV and V) in C57BL/6 mice. However, accompanying MHC class II CD4+ T cell responses remain to be characterized. Using an overlapping peptide library and immunizations with SV40 Tag derivatives lacking three MHC class I restricted epitopes, we have identified three additional sequences which appear to function as CD4+ T cell epitopes and one additional CD8+-restricted epitope which, like epitope V, appears to be immunorecessive. Previous results had indicated that simultaneous induction of strong, SV40 T ag-specific CD8+ cell responses reduced induction of SV40 T ag-specific T cells targeting one CD4+ epitope, but the effect was inconsistent. To determine if differential induction kinetics could account for such inconsistencies, parallel time course immunization experiments were conducted to characterize how T cell responses to each of these determinates developed over 17 days. Immune splenocytes harvested from SV40 Tag-immune C57BL/6 mice were analyzed by ELISPOT and intracellular cytokine staining (ICS) analyses to determine the frequencies of epitope-specific CD4+ or CD8+ T cells present at four times post immunization. The results revealed that strong responses to CD8+ T cell epitopes did not severely reduce the frequencies of SV40 T ag-specific CD4+ T cells at any time point; however, reduced spot size and intensity in the ELISPOT assay may point to qualitative differences characterized by reduced IFN- γ production by individual CD4+ cells. These results expand our characterization of hierarchical T cell responses to include effects evident among both SV40 T ag-specific CD8+ and CD4+ T cells. (123)

Nguyen, Cam* and Steven James. Biology Department, Gettysburg College, Gettysburg PA 17235. *An Anti-checkpoint Role for Aspergillus nidulans snoA^{RifI}* — Eukaryotes respond to DNA damage by activating two major damage-sensing pathways, mediated by the PI3 kinase-related kinases, ATM and ATR. ATM kinase senses double strand breaks and transduces a signal by phosphorylating, and thereby activating, a downstream mediator, CHK2 kinase. ATR senses single-stranded DNA resulting from, e.g., stalled replication forks and in turn phosphorylates the CHK1 kinase. Together, CHK1 and CHK2 kinases activate cell cycle checkpoints by phosphorylating a variety of effectors in order to halt DNA synthesis, prevent mitosis, and induce DNA repair. Acting in opposition to these two checkpoint enforcers, a recent study in budding yeast has suggested that the telomere homeostasis regulator, RIF1, may act as an ‘anti-checkpoint’ protein to fine-tune the threshold for ssDNA recognition and to facilitate recovery from checkpoint arrest. In budding yeast, Rif1 anti-checkpoint activity was limited to damage at telomeric DNA sites. Furthermore, an anti-checkpoint role for Rif1 has not been demonstrated in higher eukaryotes. In the filamentous fungus *Aspergillus nidulans*, we are using *chkA^{Chk1}*, *chkB^{Chk2}*, and the DNA synthesis regulator *nimO^{Dbf4}* to unravel the anti-checkpoint function of the Rif1 ortholog, *snoA* (suppressor of *nimO*). In this study, we show that defects in *snoA^{RifI}* partly alleviate the DNA damage sensitivity of cells lacking *chkA^{Chk1}* (Δ *chkA*), and largely reverse the checkpoint defect in cells deleted in the BRDF checkpoint domain (BRCT and Dbf4-similarity domain) of *nimO^{Dbf4}*. And, whereas *nimO Δ BRDF Δ chkA* double mutants confer synthetic lethality, loss of *snoA^{RifI}* restores viability to these strains. These findings suggest that *snoA^{RifI}* may act as a global anti-checkpoint regulator in *A. nidulans*. To test this idea further, we are continuing to study genetic interactions in cells that lack both major DNA damage response pathways mediated by *chkA^{Chk1}* and *chkB^{Chk2}*. (130)

Nicholls, Phoebe* and Ahmed Lachhab. University, Selinsgrove, PA 17870. *Water Quality Assessment of Middle Creek, Snyder County, PA* — Middle Creek is located in Snyder County; Pennsylvania is surrounded by a large farmland area. The headwater of this small stream starts at two separate branches, which merge and flow into Penns Creek which discharges into the River. Water quality analyses were performed along Middle Creek to measure the chemical and physical properties and to study the impact of farmland on the stream. It is believed that high levels of pollution in the River and the Chesapeake Bay are caused by runoff from smaller upstream tributaries. Eleven different sites were selected to collect samples from: A, B, C, D, E, F, G, H, J, Faylor Lake and Walker Lake. These sites were further split into three components: the Main Branch, the Walker Lake extension and the Faylor Lake extension. Sampling of Middle Creek occurred once a week over the summers of 2011 and 2012 where all sites were sampled in one day. Temperature,

pH, conductivity, TDS, and ORP were measured in the field using a Hach MP-6p multimeter. Dissolved oxygen was also measured using a YSI556 multimeter. Cations (Na^+ , NH_4^+ , K^+ , Mg^{2+} and Ca^{2+}) and anion (Cl^- , PO_4^{3-} , SO_4^{2-} and NO_3^-) concentrations were measured in the lab using a Dionex ICS-2000. Results show that conductivity, TDS, and ORP increase upstream along the Main Branch. Temperature and pH decreased and dissolved oxygen generally decreased downstream due to increasing water volume. Cations and anions concentrations decrease upstream along the main branch. Ammonia and phosphate concentrations were below detection limits. The impact of the lake is not fully understood. Cation and anion concentration were inversely related to temperature and pH trends. (33)

Olenick, Mara*, **Kayla Rutkoski**, **Dan Simpson**, and **Barbara Fenner**. King's College, Wilkes-Barre, PA, 18711. *The Effects of BDNF on Neuronal Survival in an Oxidative Stress Model of Huntington's Disease* — Huntington's disease (HD) is an autosomal dominant inherited disorder caused by a mutation in the huntingtin protein, which leads to neurotoxicity and neuronal death. Neuronal death mainly occurs in the striatum and cortex of the brain. Several mechanisms are involved in degeneration of neurons in HD including oxidative stress, excitotoxicity, metabolic defects and mitochondrial dysfunction. Oxidative stress plays an important role in the death of neurons in Huntington's disease. This study investigated the effect of BDNF on the survival of neurons damaged by oxidative stress. BDNF has known survival properties and we hypothesize that BDNF promotes survival by decreasing glutamate-induced oxidative stress. SH-SY5Y neurons were pretreated with BDNF before inducing glutamate toxicity. Oxidative stress was measured using H_2DCFDA fluorescence. Our results show that glutamate induces oxidative stress, but it remains inconclusive if BDNF protects against this stress. Ongoing immunofluorescence microscopy studies are measuring intracellular accumulation of ROS and cellular damage using BioGee, a compound that fluoresces in the presence of ROS, to visualize oxidative stress. (142)

Opalko, Hannah*, **Kyle Lindsay**, and **Steven A. Mauro**. Mercyhurst University, Erie, PA 16546. *Microbial Influence on the Persistence of Shiga-toxin Producing *E. coli* in Presque Isle Recreational Water* — Shiga toxin producing *E. coli* (STEC) infects over 60,000 people in the United States annually, with symptoms ranging from mild diarrhea to death. Water has been identified as a major reservoir for the transmission of this bacterial pathogen. STEC has been detected in a number of aquatic ecosystems, including the beach waters of Presque Isle State Park. The presence of STEC in Presque Isle and other water sources is sporadic, and examination of factors that govern the emergence and persistence of STEC in water are lacking. In this study, we co-incubated STEC or non-STEC bacterial strains with grazing protists in Presque Isle beach water. Using quantitative PCR and microscopy approaches to identify microbes, we demonstrate

that protists play an important role in removing STEC from an aquatic environment. However, we find that STEC strains are more resistant to protist grazing compared to non-STEC strains. Our results highlight the importance of the microcosm in modulating the persistence of bacterial pathogens in aquatic environments. (62)

Orzechowski, Amanda* and **Steven James**. Biology Department, Gettysburg College, Gettysburg, PA 17235. *Control of DNA Damage Signaling by SSPP/SSPT Motifs in *Aspergillus nidulans* *snoA*^{RifI}* — In the filamentous fungus *Aspergillus nidulans*, *snoA*^{RifI} (suppressor-of-*nimO*) and *nimO*^{Dbf4} (never-in-mitosis) are involved in DNA replication, DNA damage responses (DDR), and the induction and repair of programmed double-strand breaks (DSBs) during meiosis. *nimO*^{Dbf4} encodes the regulatory subunit of *nimO-cdc7* kinase, whose ortholog, Dbf4-dependent kinase (DDK), is a highly conserved serine-threonine kinase. RifI in budding yeast localizes to telomeres, where it maintains telomere homeostasis by inhibiting both elongation and resection. In mammals, however, RifI has evolved new functions, acting in the intra-S phase checkpoint, facilitating recovery from replication stress, and regulating origin firing during DNA replication. In *Aspergillus*, loss of *snoA*^{RifI} suppresses the temperature and DNA damage sensitivity of *nimO*^{Dbf4} mutants, suggesting that *snoA*^{RifI} may act normally to inhibit the role of *nimO*^{Dbf4} in DDR. *snoA*^{RifI} and *nimO*^{Dbf4} physically interact at a serine-proline rich region of *snoA*^{RifI}, in which are found three conserved SSPP/SSPT tetrapeptide motifs. Substitution of non-phosphorylatable alanine at all six serines (AA6x) confers strong sensitivity to double strand breaks, indicating that these three tetrapeptides in *snoA*^{RifI} may function as an on/off switch controlling a DNA damage response during mitotic growth. In this study, we have used site-directed mutagenesis to dissect the function of each of these three motifs, by e.g., mutating SSPT to AAPT. Our results demonstrate that, by itself, the second motif may act as the regulatory switch for DNA damage responses. Whereas mutations in the first and third motifs confer only weak sensitivity to genotoxic agents, alanine replacements in the second motif confer strong sensitivity similar to the original AA6x mutant. Experiments are now underway to analyze the role of each individual serine (e.g., ASPT, SAPT) in controlling the response to DNA injury. (129)

Oswald, Kaitlin A.*, **Francesca L. Prendes**, **Kristen A. Sigley**, and **Audrey J. Ettinger**. Cedar Crest College, Allentown, PA 18104. *Analysis of Aggressive Behavior, Somatic Growth Rates, and Somatostatin Neurons in Male and Female *Rocio octofasciata* (Jack Dempsey Cichlids)* — The relationship between behaviors and their physiological consequences has been studied in various species. Cichlid fish species have been utilized as model organisms to investigate this relationship due to their highly aggressive interactions and plastic social statuses. The hormone somatostatin (SST) is regulated in response to behavior in some animal species.

SST impacts growth rates through the negative regulation of growth hormone (GH). Here, we have begun to analyze the relationship between the social status of the cichlid fish *Rocio octofasciata* and the size of SST-containing neurons. We have observed pairs of fish while they established dominant/subordinate social hierarchies, and have begun to compare the sizes of SST-containing neurons in dominant and submissive males and females. We predict that dominant male and dominant female cichlid fish will have larger SST neurons, corresponding to lower growth rates, based on results from male cichlids of other species. Further investigation of this relationship will enhance our understanding of how behaviors can mold the brain, and may lend insight into human health. In humans, growth disorders have been observed in children who were raised in stressful environments, were neglected, and lacked proper nutrition, and these disruptions may result from changes to the SST-GH system, emphasizing its importance for future study. (49)

Panah, Assad *. University of Pittsburgh at Bradford, Pennsylvania 10701. *Organic Petrology and Diagenesis of Marcellus and Utica Shale Gas Deposits in Appalachian Basin* — From total of 27 identified shale gas basins in the United States, Utica shale (upper Ordovician) and Marcellus shale (middle Devonian) are amongst six unconventional shale gas formations that currently produce gas in commercial quantity from organic rich and thermally submature to mature shale over large parts of the Appalachian basin. Matrix permeability of unfractured shale is in the order of 0.01 to 0.00001 millidarcies. Organic petrography and x-ray crystallography of Marcellus and Utica Shale reveals that illite is main clay constituents of these shales, which is resulted from diagenetic alteration of pre-existing montmorillonite (illitization). For many years, organic rich black shale with Low permeability was considered as source rock for hydrocarbon deposits. Organic pore is hydrophobic and works as nanofilters for gas and oil to flow and to block water. Gas molecules in black shale are stored in micro-fracture porosity, adsorbed onto surface of mineral grains and organic matter. A clear isotopic difference exists between methane from mudgases (free/solution/lost gas-measured using Isotube) and methane from headspace (adsorbed gas, measured using Isojar). Isotopes are corresponding with increased permeability; and are used as permeability indicators. Natural gas in shale rocks are biogenic, thermogenic or combined biogenic-thermogenic in origin. NORM content of black shale increases as with increased presence of organic matter, indicating that radioactive particles are commonly attached to organic matter. Shale gas reservoir productivity capacity is defined by vitrinite reflectance (VRo value), which is an indicator of thermal maturity, total organic content (determined using gamma logs), adsorbed gas on the surface of the clay particles (commonly illite), and the amount of dissolved gas in bitumen and kerosene. Gas window occurs above VRo=1.1, and below that oil

window is commonly present. Black organic-rich shale with high clay contents are not suitable for hydraulic fracturing (Baxter Shale Green River Basin), because shale reacts as plastic rather than brittle in high lithostatic (confining) pressure when dynamic fracturing stress is applied. (4)

Pater, Ryan* and **Bruce Smith**. York College of Pennsylvania, York PA 17403. *Discernible Haploid Differences in Ecotypes, an Investigation in Arabidopsis thaliana L: Brassicaceae* — *Arabidopsis thaliana* has become the model organism for research. Two ecotypes (Graz-1 and Pitztal-2) were selected to observe subtle haploid differences within embryonic development in relation to pistil length. Using a ETOH dehydration method and the Herr's Clearing fluid the pistils were measured and ovule stage recorded. Using a Two-Way ANOVA we determined that there was a significant difference between the developmental stage and pistil length between the two ecotypes. The ecotype Pitztal-2 had a much larger pistil and faster development than Graz-1 suggesting that Pitztal-2 allocates more resources into reproduction than its neighbor Graz-1. (81)

Pattison, Amanda*, **Molly McQuilken**, and **André P. Walther**. Cedar Crest College, Allentown, PA 18104. *Replication Protein A Phosphorylation Regulates Telomere Length in the Budding Yeast Saccharomyces Cerevisiae* — Telomeres are nucleoprotein structures that cap the ends of linear chromosomes to prevent the loss of genetic information during DNA replication. The budding yeast, *Saccharomyces cerevisiae* has telomeres that are functionally and structurally similar to human telomeres making it a powerful model organism to understand the process of telomere regulation. We focused on the role of the highly conserved single stranded DNA binding protein Replication Protein A (RPA), known for its role in telomere synthesis. RPA consists of subunits Rfa1p, Rfa2p, and Rfa3p, and Rfa2p is phosphorylated in a cell cycle-dependent manner and in response to cellular DNA damage. We generated yeast strains containing mutations in RPA that mimic constitutive phosphorylation (*rfa2-Asp*) or prevent RPA phosphorylation (*rfa2-Ala*) and determined that *rfa2-Asp* strains have short telomeres and *rfa2-Ala* strains have long telomeres. We have identified genetic requirements for these mutant RPA-dependent phenotypes, by examining telomere length with Telomere Restriction Fragment Southern analysis in yeast strains containing mutations of known telomere genes in conjunction with RPA mutations. We have shown that the telomere maintenance genes *EST1*, *EST3*, and *RIF1* genetically interact with RPA phosphorylation mutations, and are examining the genetic interactions of RPA with additional telomere synthesis genes. (23)

Perez, Rafael*, **Ronald Kaltreider**, and **Bradley Rehnberg**. York College of Pennsylvania, York, PA 17403. *The Effects of Yohimbine on Ethanol Preference, Motor Coordination and c-Fos Phosphorylation in the Nucleus Accumbens of CD-1 Mice* — The link between stress and addiction is

well documented. Individuals exposed to severe stress have a higher propensity to develop alcohol dependence. Yohimbine is an alpha-2 adrenoceptor antagonist that produces stress in rodents. Yohimbine transiently increases levels of c-fos, a molecular marker of activity in the nucleus accumbens, a brain region involved in motivation. Yohimbine has been used to study reinstatement of ethanol consumption in previously dependent animals. However, the effects of yohimbine on ethanol-naïve mice remain unclear. This study aimed to investigate the ability of yohimbine to induce ethanol preference, motor disruptions, and c-fos phosphorylation in the nucleus accumbens of ethanol-naïve mice. CD-1 male mice were injected with yohimbine (2 mg/kg i. p.) or saline. Mice were then subjected to 2-bottle limited access choice tests (water and EtOH 10% v/v) and accelerating rotarod tests. There were no significant differences between the groups in terms of ethanol preference or motor coordination. These findings suggest that the effects of yohimbine-induced stress are too general to initiate behavioral changes associated with alcohol dependence. Nucleus accumbens were extracted and c-fos phosphorylation is currently being assessed by western blot. (48)

Perta, Julie M.*, Mackenzie Stamer, and John F. Harms. Department of Biological Sciences, Messiah College, Mechanicsburg, PA 17055. *Down-Regulation of Cholecystokinin mRNA Expression in Pancreatic Cancer Cells* — As the prognosis of pancreatic cancer remains extremely poor, we seek to understand factors driving its aggressive nature. Previous research has shown that the peptide hormone gastrin stimulates the growth of pancreatic cancer cells in an autocrine manner. Down-regulation of gastrin inhibits tumor growth, while down-regulation of cholecystokinin (CCK), a sister peptide with equal affinity for the gastrin receptor (CCKBR), has not displayed a clear inhibitory effect. These studies, however, utilized cell lines that express relatively high levels of gastrin in comparison to levels of CCK. We hypothesize that down-regulation of CCK in a cell line more dependent on CCK (higher levels of CCK than gastrin), may result in growth inhibition. To first validate published data, expression of CCK and gastrin was quantified by Real-time RT-PCR in a panel of six human pancreatic cancer cell lines. PANC-1 cells have high levels of CCK and relatively less gastrin. To down-regulate CCK, PANC-1 cells were transfected with pSUPER.hydro shRNA constructs targeting two sites (-6 bp, 141 bp) in the CCK mRNA. A non-specific control shRNA (NSC) was also transfected in parallel. Transfected clones were selected with hygromycin and RNA was isolated from each established line. Preliminary results suggest CCK mRNA is decreased 65-70% in a pool of PANC-1-shRNA(CCK,141) cells relative to wild-type PANC-1 cells. Real-time RT-PCR analysis to measure CCK down-regulation in clon-

al cell populations is ongoing. Clones exhibiting decreased CCK mRNA will be further confirmed by immunofluorescence analysis of peptide levels, and subsequent *in vitro* and *in vivo* growth assays will determine the impact of CCK expression in these pancreatic cancer cells. (19)

Phuong, Tiffany*, David Jennings, Antonio Serrano, and Robert Kurt. Lafayette College, Easton, PA 18042. *Creating a Tetracycline Inducible Eukaryotic Expression Vector Encoding shRNA Specific for Myd88 Using Two Recombination Reactions* — In our research we are trying to determine if Myd88 has a direct contribution and its specific contribution to tumor growth. We are attempting to create a tumor cell line with the capability to control Myd88 expression. Therefore, we needed to create a tetracycline inducible eukaryotic expression vector that encodes short hairpin RNA (shRNA) specific for Myd88. In order to create this vector, we used two recombination reactions. The BP reaction was used to recombine the vector with the attachment site B (*attB*) substrate with a vector containing the *attP* substrate. From this reaction we obtained the *attL*-containing vector, a hybrid of *attB* and *attP* sites. Next, the LR reaction was used to recombine the *attL* with *attR* in the final destination vector, so the tetracycline operator could control shRNA expression. We transformed competent *E. coli* with the new vector and received many antibiotic resistant bacteria suggesting that the two reactions were successful. Following growth of select colonies, we isolated the plasmids, quantitated the DNA, and submitted the vector for sequencing. This vector will be instrumental in making a tumor cell line to control Myd88 expression in an inducible manner and decipher the role of Myd88 in tumor growth. (127)

Pistoia, Veronica* and Jessica L. Schedlbauer. West Chester University, West Chester, PA 19383. *The Water Relations of Roundleaf Greenbrier (*Smilax rotundifolia* L.) Encroaching on Serpentine Barren Ecosystems in Southeastern Pennsylvania* — Serpentine barrens are grassland/savanna ecosystems found atop ultramafic bedrock and the unusual soils that arise from them. These ecosystems are characterized by low nutrient availability, low soil moisture, and high heavy metal content, characteristics that present stressful conditions for many plant species. Historically, serpentine barrens in southeastern Pennsylvania were subject to fire and grazing, but in the absence of disturbance sites succeed to forest. The monocot vine, roundleaf greenbrier (*Smilax rotundifolia* L.), is often found at the forest-barren interface, and may play a role in facilitating forest encroachment. To understand how *S. rotundifolia* encroaches into environmentally stressful serpentine barrens, we investigated the water relations of this vine within barren, edge, and forest growing environments. Measurements of diurnal water potential and stomatal conductance were made in June, July, and August of 2012 at three sites in southeastern Pennsylvania. Soil water availability varied across the growing season and by growing environment. Specifically, pre-dawn water potential was significantly lower

during July and was typically higher in the barren locations relative to the forest understory. Afternoon water potential measurements did not suggest water stress for *S. rotundifolia* in any of the three growing environments. Afternoon stomatal conductance rates varied across months; however, late-day stomatal closure was rarely observed in any of the growing environments. Despite the pervasive idea that serpentine ecosystems are characterized by low soil moisture availability, *S. rotundifolia* did not exhibit water stress in these environments. In fact, soil water availability was often greatest within the serpentine barren. Together, these data suggest that *S. rotundifolia* may have a competitive advantage over native grass species in places where it can overtop the grasses. (82)

Polaski, Anna*, Spacht, Drew, Tymochko, Larae, and Michael A. Elnitsky. Department of Biology, Mercyhurst University, Erie, PA 16546. *Monitoring the Hemlock Woolly Adelgid in Pennsylvania: Characterization of Cold Tolerance and Overwintering Physiology* — Invasive species pose one of the greatest threats to natural ecosystems, and present significant ecological and financial costs. Forests within the northeastern United States have been increasingly affected by invasive insect pests that damage foliage, reduce tree vitality, and can result in tree mortality and widespread forest decline. Managing these invasive species requires understanding the species' life history; because of the importance in range determination, cold winter temperatures and the strategies used to survive such conditions are important factors in evaluating the ability of invasive species to establish and spread. The hemlock woolly adelgid (HWA), *Adelges tsugae*, is an invasive insect pest that is decimating stands of eastern (*Tsuga canadensis*) and Carolina hemlock (*T. caroliniana*) throughout the eastern US ranging from northern Georgia to southern coastal Maine. Pennsylvania is very much at the center of the ongoing range expansion of the HWA; as of 2012 the eastern 2/3rd of the state has been infested by the HWA, and range expansion of the adelgid into new hemlock stands is proceeding to the north and west. We have established a state-wide monitoring network to assess the impacts of low temperature and winter survival on the current and future range expansion of the HWA. Laboratory tests demonstrate that low temperatures result in significant reductions in HWA survival. The results will be discussed in the context of the current range of the adelgid and in context of continued climate change. (90)

Pong, Alex* and Megan Rothenberger. Lafayette College, Easton, PA 18042. *Competitive Interactions Between the Blue Crab, Callinectes sapidus, and the Asian Shore Crab, Hemigrapsus sanguineus* — Estuarine environments are essential components of the marine ecosystem. However, human activities such as rapid colonization and industrialization have drastically and negatively impacted these environments. One of the largest threats comes from invasive species (IS), which can decrease the abundance and diversity of native species. Aquatic IS, such as the Asian shore crab (ASC, *Hemigrapsus sanguineus*) and the Chinese mitten crab (CMC, *Eriocheir si-*

nesis), are often transported from one port to another through the ballast water of ships. Because both of these species are relatively new to the Atlantic coast, their influence on the environment is still unknown. The objective of this study was to monitor the regional abundance and distribution of these invasive crabs at sites throughout the lower Raritan River Basin (RRB) and Raritan Bay in order to determine the current or potential ecological impact of their presence. Sites in the RRB and sites in the Bay have noticeably different species composition. The CMC was not found at any site and the ASC was only found along the river in heavily vegetated sites. One critical result is the relationship between the ASC and the economically important blue crab (*Callinectes sapidus*). These two species are known to have similar diets, and the geographic overlap in the bay suggests the possibility that these species might be competing for limited resources. Because the native blue crab is a keystone species in this region, feeding competition and aggression studies are being conducted to assess potential interactions. (163)

Pontuti, Kaitlyn M.* and Karl Kleiner. York College of Pennsylvania, York, PA 17403. *Comparison of Barn Owl (Tyto alba) Sex Ratios Between Southeastern and Northeastern Pennsylvania* — Natural selection usually favors equal parental investment in male and female offspring, leading to a 50/50 sex ratio. However there are certain circumstances that can cause deviations in this ratio, as is evident in some species of sexually size-dimorphic birds. Barn owls (*Tyto alba*) are reverse sexually size-dimorphic raptors that prefer large open areas of land such as grasslands and agricultural fields. This study compared sex ratios of barn owls between the agriculturally rich Piedmont region of southeastern Pennsylvania and the more wooded, rugged terrain of the Ridge and Valley region and Allegheny region of northeastern Pennsylvania. Feathers were collected from nest sites over four years by the Pennsylvania Game Commission as sources of DNA. DNA samples were extracted using Chelex and results were obtained by way of PCR and gel electrophoresis. Male offspring were identified by the presence of a single 600 bp band and female offspring were identified by the presence of a 600 bp band and a 1200 bp band. There were no distinct differences in sex ratio between the two regions. However there does seem to be variation in the ratio of males to females over the four years of data analyzed. The results of this study indicate that sex ratios in barn owls have less to do with differences in geographic areas and may have more to do with other underlying factors that contribute to a bias of the sex ratio. (52)

Preston, Jennifer*, Jessica Kline, and André P. Walther Cedar Crest College, Allentown, PA 18104. *The Development of a Novel qPCR Assay to Measure Homologous Recombination in Replication Protein A Mutant Saccharomyces cerevisiae* — Defects in DNA repair can lead to severe downstream defects in a cell including genomic instability, cancer, or cell death. Replication Protein A (RPA) is a single

stranded DNA binding protein which serves many functions including many DNA repair processes. These processes include nucleotide excision repair of UV damage, base excision repair of bulky adducts, and homologous recombination that repairs single and double stranded breaks in the DNA caused by environmental, chemical, gamma rays, and defects in the DNA replication process. To study the role of RPA in homologous recombination, we have taken advantage of the Mating type switching mechanism in the budding yeast *Saccharomyces cerevisiae*. Haploid yeast cells can exist as either MATa or MAT α mating types, and the haplotypes can switch mating types from MATa to MAT α through a site directed homologous recombination event at the Mating Type Locus. Homologous recombination is initiated by a single Double Strand Break caused by the HO endonuclease that is under the control of a galactose-inducible promoter. We have developed a real time polymerase chain reaction (qPCR) based assay to measure homologous recombination at the MAT locus by inducing a break and collecting genomic DNA from yeast at 0, 1, 2, 3, 4, and 5 hours after the addition of the galactose. The repair efficiency of the induced double stranded break was monitored using qPCR with primers that could distinguish between the initial MATa and the repaired MAT α . Our preliminary results indicate that mutations in RPA lead to a defect in homologous recombination, validating this novel homologous recombination assay. (133)

Reinford, Quentin* and **Mel Zimmerman**. Lycoming College, Williamsport, PA 17701. *Monitoring Nutrient and Sediment Loads and Effectiveness of Farm BMP's* — The goal of this joint project between the Lycoming College Clean Water Institute (CWI), Lycoming County Planning Commission and the Lycoming County Conservation District is to facilitate and monitor the cost effective implementation of agricultural best management practices (BMP's). Three farms (two Amish and one organic) are participating in the project. The project monitored the water quality of an unnamed tributary of White Deer Hole Creek, Elimsport, PA. Levelloggers were placed at three locations to collect stream flow. The collection of baseline water chemistry, nutrient and sediment load was taken on a monthly basis for a year prior to establishment of BMP's (riparian buffers and no-till farming). BMP's were started on the farms during spring 2012. Baseline electrofishing and macro benthic samples were also taken and used to determine a Rapid Bio assessment indication of water quality. Nutrient load data increased from the upstream to downstream sites due to agricultural runoff as shown by the calculation curve and levellogger data. The effect of high water flows during storm events can be seen. Any conclusions of the effectiveness of the best management practices are limited at this time but the project will continue to be monitored. (34)

Rittenhouse, Jennifer* and **Marianne Staretz**. Cedar Crest College, Allentown, PA 18104. *Examination of Fluoride Levels in Beverages Commonly Consumed by Children* — Excessive fluoride exposure in children can cause dental fluorosis, a condition characterized by defects in the enamel of the teeth. The recommended levels of fluoride intake for children are 0.7-1.5 mg/L daily. At these levels, there can be a beneficial effect on the prevention of dental caries although higher levels increase risk of dental fluorosis. It is estimated that 32% of American children have some form of fluorosis. Exposure to fluoride can be found in many sources. This project focuses on examining the concentration of fluoride ions found in beverages consumed by children. After concluding iced teas have an excessive amount of fluoride, further analysis was completed to determine the source. A variety of tea bags were analyzed and found to contain high levels of fluoride. To assist in preventing dental fluorosis, parents and medical/dental practitioners must be made aware of any beverages that may expose children to a risk of dental fluorosis. (153)

Rocklyn, Amanda E.*, **Allison M. Osborne***, **Alicia A. Zook**, **K. Joy Karnas**, and **Audrey J. Ettinger**. Cedar Crest College, Allentown, PA 18104. *Understanding the Cellular and Molecular Mechanisms of Neural Protection by Ginkgo biloba in a Gallus gallus Primary Neuron Culture* — The herbal remedy *Ginkgo biloba* has been used in traditional medicine for centuries as a memory enhancer, and has recently been studied as a natural antioxidant and potential treatment for multiple nervous system diseases. The expanding literature on *Ginkgo biloba* suggests that it may be useful as a neuroprotective agent in disorders that result in neuronal apoptosis, such as ischemic stroke. In this study, *Gallus gallus* neurons in primary cell culture were exposed to glutamate to simulate ischemic stroke, and rescued with *Ginkgo* treatment to determine whether this natural neurotropic agent can provide protection from glutamate-induced apoptosis. Analysis involved both light microscopy to assess cellular structure and microarray analysis to investigate the resulting gene expression changes. Specific genes were identified as having altered expression (e.g. Nerve Growth Factor Beta Polypeptide (NGF) and Aquaporin 1 (AQP1)), or remaining steady-state (e.g. RNA Binding Motif Protein 7 (RBM7), Heat Shock 10kDa Protein 1 (HSPE1)) in response to *Ginkgo* treatment. Confirmatory studies were conducted using SYBR Green One-Step qRT-PCR to further quantitate differences in the expression of these genes. Future analysis will use a fluorescent apoptosis/necrosis kit to analyze the mode and amount of cell death, and Western blot to examine changes in apoptotic caspase activation. Our long-term goal is to gain an understanding of the cellular and molecular mechanisms by which *Ginkgo* provides neural protection during or immediately following ischemic stroke, and

to ask whether the timing of *Ginkgo* administration can be optimized to provide maximal protection, preventing the cell death that generally follows the disruption of blood flow to the brain and downstream loss of cognitive function, paralysis, or death. (141)

Rogers, Fred* and **Mel Zimmerman**. Lycoming College, Williamsport, PA 17701. *Biological Response of Two North Central PA streams after the Flood of September 2011* — Within Pennsylvania, there exists a variety of threats to stream ecosystems. Agricultural activities, urbanization, and natural gas exploration are a few examples of anthropogenic threats. However, impacts of 100 and 500 year flood events can also significantly alter stream habitat and biota. This project compares pre and post data of the September 2011 flood on two tributaries of Loyalsock Creek (Big Bear Creek and Ogdonia Creek, North Central, PA). Pre-data on these streams started in 1999 with Ogdonia as a control site for a Natural Stream Channel Design (NSCD) project on Big Bear Creek. A status update of the 127 NSCD structures along Big Bear Creek is presented. Macro invertebrates and fish were sampled 8-9 months after the flood on both Big Bear and Ogdonia Creek and indicate that the biota is progressing back to pre-flood conditions. (36)

Rothenberger, Megan, Thomas Swaffield*, Alyssa Calomeni, and Carolyn Cabrey. Lafayette College, Easton, PA 18042. *Fifty Years Later: Re-examining the Cultural Eutrophication Problem in Raritan Bay, NJ Using Environmental Monitoring and Multivariate Ordination Techniques* — The Hudson-Raritan estuary of New York and New Jersey is one of the most urbanized estuaries, and busiest ports, in the world. Not surprisingly, this system has a long history of cultural eutrophication and associated ecosystem instability. Of particular concern in eutrophic coastal ecosystems is the stimulation of harmful algal blooms (HABs), which cause environmental damage by depleting available oxygen or producing toxins. Despite the striking chemical and biological alterations that are occurring in this system, publications in the early 1960s were the last to report on *both* environmental parameters and plankton dynamics in Raritan Bay (RB). The objectives of this research are to 1) establish a monitoring study to characterize water quality trends in a eutrophic estuary, 2) compare current environmental conditions to those documented in this system more than fifty years ago, and 3) to further clarify the relationship between nutrients and algal bloom generation in this system. Monthly data collection at six sites in RB began in April 2010 and is ongoing. Nitrate (N) and soluble phosphorus (SRP) concentrations are as much as 50 and 20 times higher, respectively, than concentrations reported in the literature fifty years ago. Both N and SRP increased following periods of high precipitation associated with Atlantic hurricane season (e.g., Tropical Storm Irene). This study also provides new insights about seasonal, climatic, and anthropogenic influences on phytoplankton and HABs. A total of 14 HAB species have been

identified, including *Heterosigma akashiwo*, which formed a massive bloom in the upper RB during summer 2012 and created hypoxic conditions. Multivariate analyses indicate that abundance of this potentially harmful species is positively associated with high temperature, salinity, N, and SRP in RB. The data also suggest that precipitation and river discharge play an important role in controlling plankton composition and bloom formation. (167)

Rounsville Jr. , Thomas^{1*}, Justin H. Bohling², and Jane E. Huffman¹. ¹Northeast Wildlife DNA Laboratory, East Stroudsburg University, East Stroudsburg, PA 18301. ²The Pennsylvania State University, State College, PA 16802. *Landscape Genetics of the Coyotes (*Canis latrans*) of the Eastern United States* — Within the past 75 years coyotes have expanded their range into nearly all available habitats in North America, becoming one of the most successful mammalian predators on the continent. While coyotes are now found throughout North America, little is known about the population genetics of this expansion. Historically, species that have contiguous distributions have been considered to be a single freely mixing population, without researching the truth of this assumption. Two hundred eight tissue and Nobuto blood strip samples were analyzed from 10 states and 67 counties at 17 nuclear microsatellite loci to determine localized allelic frequencies and gene flow at the landscape scale. A Mantel test, a Bayesian clustering algorithm, Exact G Tests, Principle Coordinates Analyses (PCA), and Wright's F-Statistics were then used to evaluate whether or not the coyotes of the eastern United States exhibit panmixia. These coyotes were determined to be most appropriately characterized by two geographically distinct populations with admixture occurring between them. One genetically distinct population is located within the state of Florida, and the other genetically distinct population can be found in Pennsylvania, with uneven mixing occurring between these two source populations. (100)

Rubin, Amanda*, Noelle Kosarek*, Maria Liberti, and Robert Kurt. Lafayette College, Easton, PA 18042. *Murine Mammary Carcinoma Cell Growth Inhibition by Auranofin* — Auranofin is a sulfur containing gold (I) compound that is conventionally used to treat rheumatoid arthritis and is known to have anti-inflammatory properties. Previous studies have indicated that auranofin suppresses the activation of transcription factors mediated through the NF- κ B and JAK/STAT pathways. Because many cancers are mediated through these pathways, the effects of auranofin were previously tested on several types of tumor cells, including acute promyelocytic leukemia, human hepatoma, and multiple myeloma cells. These studies indicated that auranofin was effective in inhibiting tumor cell growth. Although auranofin is known to reduce cancer cell growth due to its anti-inflammatory characteristics, little is known about the biochemical mechanism(s) by which auranofin acts on the cancer cells. This study was initiated to elucidate the effects of auranofin on

tumor cell growth and to determine whether auranofin could influence growth of breast cancer cells. For this purpose, we tested auranofin on 4T1 murine mammary carcinoma cells to determine whether or not it inhibited cell growth and found that auranofin significantly reduced tumor cell growth in a time- and dose-dependent manner. Current studies are underway to decipher the biochemical mechanism(s) by which auranofin acts on breast cancer cells. (128)

Runner, Kaitlyn*, Jenni Lisiewski, and Barbara Fenner. King's College, Wilkes-Barre, PA 18711. *The Effects of Brain-Derived Neurotrophic Factor and Vascular Endothelial Growth Factor on Glutamate-induced Cell Death in SH-SY5Y Cells* — Oxidative stress, the accumulation of reactive oxygen species (ROS), is implicated in the pathogenesis of many neurodegenerative diseases. Brain derived neurotrophic factor (BDNF) can promote neuronal survival and differentiation. Vascular endothelial growth factor (VEGF) is a potent angiogenic factor necessary for blood vessel formation. There is evidence that VEGF may have neurotrophic effects in the brain. Therefore, the purpose of this project was to determine if BDNF and VEGF could reverse neuronal injury in an oxidative stress model of neurodegeneration. For our experiments, we used glutamate to induce cell death in SH-SY5Y cells (a neuroblastoma cells line). From our experiments, we can conclude that glutamate induces cell death in a dose-dependent manner. BDNF did prevent cell death, in our model, but VEGF did not. Light microscopy studies suggest that VEGF may be inducing neuronal differentiation, instead of survival. Future studies will address the role of VEGF in neuronal differentiation. (143)

Rutkoski, Kayla*, Daniel Simpson, Mara Olenick, and Barbara Fenner. King's College, Wilkes-Barre, PA, 18711. *The Effects of Brain-Derived Neurotrophic Factor on Neuronal Injury in an Oxidative Stress Model of Amyotrophic Lateral Sclerosis* — Amyotrophic lateral sclerosis is a neurodegenerative disease whose pathogenesis has been attributed to motor neuronal injury and eventual death. The main contributor to this injury and death is oxidative stress. Oxidative stress is the imbalance of antioxidants and toxic oxygen derivatives, namely reactive oxygen species (ROS). ROS-mediated oxidative stress has become a major interest due to the abundance of reactive oxygen species being detected in patients with ALS, and other neurodegenerative diseases. Brain-derived neurotrophic factor is a growth factor that promotes neuronal survival and differentiation. The purpose of this project was to analyze the effects of BDNF, when used as a pretreatment, on neuronal death in an *in vitro* model of oxidative stress. Our model used glutamate to induce oxidative stress in SH-SY5Y cells, a neuroblastoma cell line commonly used in *in vitro* models of neurodegeneration. We hypothesized that BDNF would act as a neuroprotective agent and reduce oxidative stress in neurons. During our project we were able to conclude that glutamate induces oxidative stress in a dose-related manner. BDNF did not reduce the

amount of oxidative stress. However, extensive exposure to the neurotrophic factor could have affected the results. ABDNF, fluorescently tagged BDNF, yielded similar amounts of oxidative stress as BDNF. We plan to use ABDNF to analyze the actions of BDNF in the cell via immunofluorescence microscopy. Ongoing studies are investigating the effects of BDNF on oxidative stress when SH-SY5Y cells are co-treated with the BDNF and glutamate. (25)

Santiago, Marc A.* and Jack R. Holt. Susquehanna University, Selinsgrove, PA 17870. *Biological Assessment of the Upper Main Stem of the River Using Phytoplankton and Periphyton* — Five sites were monitored between Sunbury and Selinsgrove on a transect near Shady Nook, Byers Island on the River for periphyton and seven sites for phytoplankton (metaphyton) from June through October. The purpose of the study was to examine the metaphyton and periphyton populations of the river during the summer and autumn in order to determine the stability of the algal ecosystem and assess the quality of the river. A total of 87 species of algae were identified in the phytoplankton communities taken from whole water samples. Artificial substrates made of glass microscope slides (periphytometer) were placed in the river for a total of 3 weeks and 26 diatom taxa were found. Additionally, during the fall study, particular habitats were sampled along a 500 meter reach at each of two sites: at the west shore with water from the west branch and on the shore of Byers Island with water from the north branch. These Samples were taken from cobble, stone, plant, and sediment, which were measured proportionally according to each site. Together, a total of 134 species of algae were identified within the transect (both periphyton and plankton). Metrics such as the Pollution Tolerance Index (PTI), Shannon Weaver diversity index and Bray Curtis similarity index were used to determine community composition, species distribution, and site similarities. Data analyzed from the summer months showed Shannon Weaver values for phytoplankton that ranged from 1.53 to 2.90 and 0.31 to 1.91 for periphyton. PTI values based on the observed periphyton collected from the periphytometers ranged from 2.7 through 2.99. Comparisons between plankton and the various biofilm communities will be presented. (35)

Schaeffer, Erin*, Kimberly Barry, Chandler Grant, and K. Joy Karnas. Cedar Crest College, Allentown, PA 18104. *Investigation of mRNA Degradation in Biological Fluids for Time of Deposition Estimation* — It has been established that nucleic acids isolated from biological fluids can be used to identify the individual who left the stain (DNA) and the nature of the stain itself (mRNA). Previous work used qRT-PCR to study the integrity of the 5' and 3' ends of mRNA in deposited stains to assess whether they are specifically degraded over time at various temperatures. That study indicated that there are different methods for the degradation of distinct mRNAs in deposited stains (e.g. 3' end degradation versus 5'). This study builds on those previous methods, us-

ing bacterial RNA as a steady-state control to confirm the differential degradation. Future goals of this project include the development of a method for using mRNA from a deposited stain to approximate the time it was left at the scene of the crime. (156)

Schaeffer, Richard, Julie Fenton*, and **Caleb Wehrmann***. Messiah College, Mechanicsburg, PA 17055. *The Synthesis and Characterization of Halogenated Barium Apatites* — The synthesis of three series of halogenated barium apatites $[\text{BaApX} = \text{Ba}_{10}(\text{PO}_4)_6\text{X}_2]$, where $\text{X} = \text{Cl}, \text{Br}, \text{I}$, and BaApOH , were attempted from aqueous solution as a possible remediation method for alkali-earth contaminated natural waters. BaApX species were prepared by mixing solutions of binary barium halide $[\text{BaX}_2]$, ammonium hydrogen phosphate, excess NaX (in some cases), and stirring for periods from four hours to seven days. Solid products were filtered, washed, dried, and analyzed with Powder X-ray diffraction (XRD) and elemental analysis, which confirmed the synthesis of BaApCl and BaApOH , but indicated the lack of formation of the bromide and iodide congeners. Unit cell parameters determined from full pattern analysis of the XRD patterns were consistent with published values for BaApCl . In addition, an activity-based K_{sp} value for BaApCl was determined to be about 8×10^{-101} , which is consistent with the known insolubility of apatite phases. These data suggest that at least the chlorinated apatite material, BaApCl , has the stability and insolubility to be an effective remediation agent for dissolved barium in natural waters. (158)

Schell, Stephanie* and **Lawrence Mylin**. Messiah College, Mechanicsburg, PA 17055. *Site-Directed Mutagenesis of Multiple Major Histocompatibility Class II-Restricted Epitopes in Simian Virus 40 Large Tumor Antigen* — Mounting effective cell-mediated immune responses to proteins produced by pathogenic microorganisms or tumors requires the participation of both antigen-specific CD8^+ and CD4^+ T cells. While CD8^+ T cells destroy infected host cells, CD4^+ T cells promote the activation and establishment of long lived, high quality CD8^+ memory T cells. Our laboratory has studied control of simian virus 40 large tumor antigen (SV40 T ag)-induced tumors by CD8^+ T cells, and now wishes to investigate the role and requirement of SV40 Tag-specific CD4^+ T cells in short and long-term tumor control. Recently, our laboratory has identified three MHC Class II-restricted epitopes in the SV40 Tag. It will be important to determine the requirement for individual or combinations of these CD4^+ epitopes in immunization and tumor control studies. The goal of this work was to inactivate these MHC Class II-restricted epitopes individually and in combination by deletion or codon substitution, using site-directed mutagenesis. Screening of candidate plasmids for the presence of these small deletions or substitutions was performed through restriction analysis and PCR amplification. Sequencing of multiple sets of candidates has indicated success for each in-

dividual epitope mutation as well as double and triple epitope mutations. Mutant plasmids containing the desired sequence alterations are being used to transfect primary murine kidney cells to establish immortal cell lines which can be used for immunization studies. (122)

Schiff, Nicholas* and **J. Michael Campbell**. Mercyhurst University, Erie, PA 16546. *Long-term Changes in Pattern of Occurrence of Strong Tornadoes and Outbreaks in the United States, 1900-2011* — From records of intense tornadoes from 1950-2011, distinct patterns emerged, now examined back to 1900. First, the number of intense tornadoes appeared to spike every eight to nine years; and second, the intense tornadoes appeared to occur in phases, one of high activity from 1952 to 1976, and one of lower activity from 1977 until at least 2010. While these specific patterns did not extend all the way back to 1900, other long-term patterns being investigated include periods of regular high and low activity and shifts in trends of seasonal activity. The explanatory analysis will consider El Niño Southern Oscillation (ENSO) and drought phenomena. Variation in occurrence of major tornado outbreaks since the beginning of the Twentieth century and frequency of tornadoes of all intensities in more recent years will be compared regionally within the U.S. There was a strong trend of increase in the occurrence of tornadoes of all intensities in Mississippi and Alabama over the time frame from 1991-2011. (92)

Schilling, Megan*, Matt McDonnell, and Christopher Brey. Marywood University, Science Department, Scranton, PA 18509. *Effects of the klf-2 Gene on Caenorhabditis elegans Fecundity* — Organisms store energy as fat within adipose tissue. The regulation of this is directly related to the fitness of the organism. Problems with fat storage may lead to obesity related diseases such as heart disease and type 2 diabetes. *Caenorhabditis elegans* have the ability to regulate fat metabolism depending on food availability. This makes *C. elegans* an excellent model organism to study fat metabolism in due to its homology to humans. The nematode's sequenced genome allows for the study of conserved genes and mechanisms, including the mechanisms for fatty acid synthesis and fat metabolism. The Krüppel-like Transcription Factors, KLFs, regulate lipid accumulation within the intestines of the worm and are major factors of adipogenesis. The *Ce-klf-1* and *Ce-klf-3* genes, which relate to human *klf-1*, have been studied in great detail, however little information is known about the *Ce-klf-2* gene, related to human *klf-7*. The objective of this project is to determine whether the *klf-2* mutant worms experience the same effects seen in previous studies of other KLF mutant worms. *Ce-klf-3* mutants, with a 1.6 kb deletion, experience severe reproductive defects causing the worms to become sterile or semi-sterile. The *klf-2* deletion

determined through PCR and sequencing, spans about 2.1 kilobases including the 3' end of exon 1 to the 5' end of exon 3. Assays and tests will be performed in order to determine if there is any effect on the fecundity of the *klf-2* mutants. Results will be reported at the conference. (112)

Sell, Shannon V.^{1*}, Glenn R. Jones¹, Gail L. Matters², and John F. Harms¹. ¹Department of Biological Sciences, Messiah College, Mechanicsburg, PA 17055. ²Department of Biochemistry and Molecular Biology, Penn State College of Medicine, Hershey, PA 17033. *Expression of the Human Gastrin Receptors CCKBR and CCKCR in PANC02 Murine Pancreatic Cancer Cells* — Pancreatic cancer is the fourth leading cause of cancer mortality. The gastrointestinal hormone, gastrin, stimulates human pancreatic cancer growth via its receptor, CCKBR, and a splice-variant of CCKBR (termed CCKCR) detected only in cancer cells. This cancer-associated variant retains the fourth intron and exhibits increased cell signaling. Recently, a single nucleotide polymorphism (SNP; C>A) in the fourth intron was identified. Presence of SNP(A) was correlated with CCKCR protein expression in pancreatic cancer specimens and decreased patient survival. We hypothesize expression of human CCKCR in murine pancreatic cancer cells will increase tumor growth and metastasis relative to expression of human CCKBR. The aim of this study was to engineer PANC02 murine pancreatic cancer cells to express hCCKBR or hCCKCR (each SNP form). While vectors encoding hCCKBR and hCCKCR-SNP(C) existed, a version mutated to form the SNP(A) required sub-cloning into a vector capable of transfection and selection in mammalian cells. The gene was excised and ligated into pCAGEN.neo. Resulting clones were screened by restriction analysis to confirm insertion and correct orientation of the gene. DNA sequencing confirmed the status of the SNP in each vector. Next, hCCKBR, hCCKCR-SNP(C), hCCKCR-SNP(A) and empty-vector (pCAGEN.neo) were transfected in parallel into PANC02 cells. Resulting neomycin-resistant clones were isolated and RNA was harvested. Clones were screened for up-regulation of corresponding receptor mRNA by endpoint RT-PCR (GAPDH, loading control). Up-regulation was evident in most clones: hCCKBR (11 of 11 clones), hCCKCR-SNP(C) (7 of 10), and hCCKCR-SNP(A) (11 of 11). Real-time RT-PCR analysis is currently ongoing to more precisely quantify mRNA expression relative to empty-vector controls. The results of this study will permit *in vivo* tumor growth and immunotherapy studies in an immune-competent syngeneic murine model. (18)

Seltzer, Jedediah*, Alex Rankin, Daniel Ackerman, Bethany Lashbrook, Erin Eperthener, and Fred J. Brenner. Grove City College, Grove City, PA 16127. *Examining Deer Dispersal Patterns Through Mitochondria DNA Sequence Analysis* — The white tailed deer (*Odocoileus virginianus*) is the most abundant ungulate in the eastern United States and understanding deer dispersal patterns is important for managing this species, especially in urban environments. Previous

studies suggest that male white-tailed deer are responsible for the genetic variation in the species. By sequencing the non-coding mitochondria displacement region (D-Loop), haplotypes were assembled from these sequences and the nucleotide diversity and Fst values of the sequences were calculated. Using haplotype and diversity measurements maternal lineage, phylogenetic trees were constructed to determine local deer dispersal patterns. In this study, samples were obtained from the Dayton Ohio Metropark system, Mercer County Pennsylvania, and Presque Isle State Park in Erie, Pennsylvania. Each of these sampling regions represents unique habitats ranging from rural, agricultural settings to urban parks surrounded by high density housing. Current results suggest that deer dispersal is affected by habitat and surrounding land use. Haplotype mapping of 80 sequences produced 22 haplotypes within the three regions. Several haplotypes are present in multiple regions suggesting common ancestry. Preliminary results suggest that migration between deer from Mercer County, PA and in Dayton, Ohio occurs at a higher rate than migration between Presque Isle and the surrounding area. (101)

Serrano, Antonio* and Robert Kurt. Lafayette College, Easton, PA 18042. *Construction of an Inducible Eukaryotic Expression Vector to Down-regulate Myd88 Expression in a Mouse Breast Cancer Model* — Research supports a link between the immune system and tumor growth. As a result, scientists have targeted TLR receptors, cytokines and macrophages to reduce tumor growth. We previously targeted myeloid differentiation primary response protein 88 adapter protein (Myd88) with siRNA and found that Myd88 inhibition could successfully down-regulate tumor growth. However, difficulty ensued while generating a stable 4T1 murine mammary cell-line that expressed the shRNA with Myd88 specificity. The difficulty could be due to the importance of Myd88 for tumor growth. For this reason we are attempting to genetically modify the tumor cells so Myd88 expression can be turned on or off. Creation of a tetracycline inducible eukaryotic expression vector would provide a controllable method that would target Myd88 after a stable cell-line is generated. In order to identify the optimal shRNA sequence to target Myd88, we initially screened three different oligos specific for Myd88. The oligos were ligated into an expression vector and used to transfect 4T1-9 cells. The 4T1-9 cells were screened and Myd88 expression was measured by quantitative reverse transcriptase polymerase chain reaction (QRT-PCR). After identifying the optimal shRNA sequence, two copies of the DNA encoding the Myd88 specific shRNA were linked together and transferred to the final destination vector. Sequence analysis verified that we successfully generated the tetracycline inducible eukaryotic expression vector. This vector will be transfected into a cell line that also expresses the tetracycline repressor. The inducible vector system will be tested by treating cells with varying levels of tetracycline and analyzing Myd88 expression by QRT-PCR.

A reliable down-regulation would enable future studies to investigate the influence of Myd88 on cytokine expression, the cell cycle, apoptosis, and aid in the understanding of the Myd88 molecular pathway. Ideally, an increased understanding of Myd88 could lead to the development of new cancer drugs. (21)

Sharber, Seth*, William Tidwell, Kyle Burch, and Anne Reeve. Messiah College, Mechanicsburg, PA 17055. *Synthesis of a Key Intermediate and Analogs of Aspernigrin A* — Aspernigrin A is a cytotoxic pyridone natural product produced by an *Aspergillus niger* strain harbored in the Mediterranean sea sponge *Axinella damicornis* and by the endophyte *Cladosporidium herbarum* obtained from *Cynodon dactylon* (crabgrass) tissue. The synthesis of the natural product and structural analogs was undertaken in order to eventually study the structure-activity profile of aspernigrin A and a series of related compounds against human colon cancer cell lines. The interesting 3-carboxy-, 6-alkyl- or aryl- substituted 4-pyridone was constructed from a 6-substituted 4-hydroxy-2-pyrone precursor. Several pyrone precursors with electron releasing and electron withdrawing substituents were prepared in good yield from the reaction of the trimethylsilylenolether of acetophenone derivatives and malonyl dichloride. Conversion of the 6-methyl analog to 6-methyl-3-carboxy-4-pyridone was accomplished in good overall yield using mild reaction conditions and comparatively safe reagents (dimethylformamide dimethylacetal followed by methanolic ammonia.) Several approaches to the 6-benzyl-4-hydroxy-2-pyrone needed for aspernigrin A syntheses were undertaken with a varying degree of success. The most promising involves oxidizing the 6-methyl group of 6-methyl-4-hydroxy-2-pyrone to the corresponding bromide followed by Pd-catalyzed cross coupling with tributylphenyltin. A direct route, which corresponds to the strategy undertaken for the phenyl analogs, using the kinetic enolate of benzyl methyl ketone, is in progress. (65)

Sheagley, Jordan and Christopher Brey*. Science Department, Marywood University, Scranton, PA, 18509. *Evaluation of Lipid Deposition in klf-2 Mutant Caenorhabditis elegans* — The results of this study are part of a multi-institutional collaboration in which the goal is to understand the consequences of abnormal fat fluctuation and its profound importance in the management of human obesity and obesity's link to metabolic disorders like diabetes and cardiovascular disease. To investigate this fat storage problem we use *Caenorhabditis elegans* as our model system. We are interested in the *klf-2* gene, a member of the Krüppel-like Transcription Factor family. The other two members of the KLF family, *Ce-klf-1* and *Ce-klf-3*, have been shown to be integral factors in *C. elegans* ability to regulate fat. Our aim in this study was to examine a third *klf*, *Ce-klf-2* and determine if it was also vital to lipid metabolism in *C. elegans*. Based on the data from *Ce-klf-1* and *Ce-klf-3* research, we hypothesize that the *Ce-klf-2* mutant will be unable to properly metabolize its fat reserves. To test this

hypothesis, Oil Red O fat staining was used to observe the fat level content between the N2 wild type *C. elegans* and the *Ce-klf-2* mutant worm. After an equal period of starvation (8-16 hrs) the larva (L2-L3) from both isolates were stained and the lipid droplets were analyzed under a compound light microscope. We will present our results at the conference. (136)

Shivani, Desai*, Chelsea Thompson, and Alan Hale. Cedar Crest College, Allentown, PA 18104. *Determination of the Initial Latency Period of Coliphage, CøSL1* — Phage therapy involves the use of viruses to eliminate bacterial pathogens from humans or other species. This method of therapy has been used to treat bacterial infections as an alternative to antibiotics due to the high host specificity of phages and because of the rise of antibiotic-resistant microbes. This study aimed to determine the latency period, the time between adsorption and lysis, of bacteriophage, CøSL1, with its host, *Escherichia coli* strain C-FCL207. Rapid production of the progeny phage is a positive quality when selecting phage for therapy. A time series experiment was run beginning with the initial exposure of the host population to phage. Samples were extracted at 10-minute intervals, followed by filtration to separate free phage from *E. coli*, and then analyzed for phage titer using the top agar overlay protocol. Lysis of the host population begins within 30 minutes after exposing it to phage. In addition, before the initial lysis process is complete, the phage titer has increased by 2300 times the initial concentration of phage, suggesting indirectly a burst size of considerable magnitude for phage, CøSL1. Although the burst size has yet to be determined, when a phage is selected for use in phage therapy, one with a large burst size is also an attractive characteristic because more phage will be produced per unit time at the site of the tissue infection. (148)

Shupinski, Alex* and Howard P. Whidden. East Stroudsburg University, East Stroudsburg, PA 18301. *Assessment of Skeletal Injuries in Bats Killed at an Eastern Pennsylvania Wind Farm* — Recent research has demonstrated significant bat mortality at wind farms in eastern and central North America. A major cause of mortality appears to be barotrauma — tissue damage due to pressure changes — but many carcasses also show significant skeletal injuries. We assessed the proportion and types of skeletal injuries in a sample of bats collected during mortality surveys at the Locust Ridge I Wind Farm in Schuylkill Co., PA. Collected carcasses were initially frozen and then prepared into voucher specimens. A dermestid beetle colony was used to clean the skeletons prior to analysis; some specimens were prepared as study skins with partial skeletons and others as complete skeletons. Our initial sample of 60 bats included hoary bats, eastern red bats, silver-haired bats, and tricolored bats. In our sample, 32 specimens (53%) exhibited cranial injuries, such as a damaged skull roof or broken zygomatic arch. Another major injury type was broken ribs, present in 25 specimens (42%). Finally, 20 specimens had broken clavicles (33%). Many

other types of skeletal injuries were present at lower frequencies. These results suggest that while barotrauma may be a major factor in bat mortality at wind facilities, a majority of carcasses had skeletal injuries as well. It remains unclear whether these injuries were caused by direct contact with turbine blades or whether they resulted from impact with the ground. (56)

Simmon, Jennifer*, Lauren McKean, and Amy J. Reese. Cedar Crest College, Allentown PA 18104. *Are Clinical Rhodotorula Fungal Strains More Robust Than Environmental Strains?* — We breathe in fungal spores everyday from the environment, but usually they do not make us sick. When patients are immunocompromised, however, they are much more at risk for diseases from fungi. For example, *Rhodotorula* yeasts are becoming more common as causative agents of meningitis, sepsis, and infections of central venous catheters placed into veins of the body. These fungi are not as susceptible to some common antifungal treatments as other fungi, making them of particular concern in the medical setting. The overall goal of this research is to better understand the biology of the yeast in order to provide possible pathways for future antifungal drug design. While little is known about *Rhodotorula*, encapsulated *Cryptococcus* yeast cells appear to be similar in several ways so we are using *Cryptococcus* as a model to study *Rhodotorula*. Analysis of cell growth in various challenging conditions is a valuable way to characterize strains, as capsule and cell wall integrity may be critical for cell survival and virulence in the host. These methods have been used to study *Cryptococcus* and we were curious to apply them to environmental and clinical *Rhodotorula* strains to see if the clinical strains were more tolerant. Test conditions of interest include 30 °C and 37 °C growth in standard media plus caffeine, sodium dodecyl sulfate, Congo red, or calcofluor white. Preliminary results suggest that in fact the clinical strains do appear more robust than the environmental strains, as exhibited by more plate growth. Further studies are underway to determine in which conditions the cells are harder and to what extent. This stresses the need for analyzing clinical strains in addition to environmental strains when exploring the basis for fungal biology and possible antifungal mechanisms. An ideal antifungal would be effective against both populations of *Rhodotorula* species. (70)

Simpson, Daniel*, Kaitlyn Runner, Mara Olenick, Kayla Rutkoski, and Barbara Fenner. King's College, Wilkes-Barre, PA, 18711. The Effects of Brain-Derived Neurotrophic Factor on Neuron Survival in a Glutamate-induced Oxidative Stress Model of Progressive Supranuclear Palsy — Progressive supranuclear palsy (PSP) is a neurodegenerative disease affecting the basal ganglia, producing motor symptoms similar to those seen in Parkinson's Disease. Increased reactive oxygen species (ROS) and oxidative stress are associated with the hyperphosphorylation of tau, a protein that aggregates in neurons of PSP patients. Brain derived neurotrophic factor (BDNF) is a potent neurotrophin

that may reduce oxidative stress. The purpose of this study was to determine if BDNF could prevent cell death, as well as reduce oxidative stress in SH-SY5Y cells, if treated prior to glutamate-induced toxicity. We hypothesized that BDNF would reduce the amount of ROS produced during glutamate exposure. Our data demonstrate that BDNF was capable of rescuing SH-SY5Y cells from glutamate-induced cell death. Our results also showed that glutamate induces oxidative stress in a dose-dependent manner. BDNF and ABDFN (fluorescently tagged BDNF) did not reduce oxidative stress in our model. Therefore our current research is focusing on manipulating the concentration and timing of BDNF-treatments, prior to glutamate-induced toxicity. (26)

Singleton, David and Rob Harvey*. York College of Pennsylvania, York, PA, 17403. *Analysis of Microbial Community Differences between a Low Lying Area and an Upland Area* — Low lying areas have already been differentiated from upland areas based on the vegetative content and other factors. However, not much has been done comparing microbial communities between these two areas. The objective of this study was to compare microbial communities between two areas, one of which borders a stream, and the other on top of a nearby ridge. Soil samples were obtained using a soil probe at three depths, at the surface, 6 inches, and 12 inches. Samples were sealed in zip lock bags and stored at 4 °C until needed. For the surface and 6 inch measures, viable plate counts were performed. The trend indicated that the number of colony forming units (CFUs) declined with depth, possibly due to anaerobic conditions. Biolog EcoPlate plates were used to evaluate the functional diversity, richness, and evenness. PCR amplification of the 16S ribosomal gene, followed by temperature gradient gel electrophoresis was used to help quantify community diversity. The EcoPlates indicated that overall at the low lying site there was a higher functional diversity and functional richness, with a downward trend observed as depth increased in both areas. Functional evenness did not have a clear cut trend. An interesting development was that the 12 inch depth at the low lying site had on average a higher number of colonies compared to the surface measurement, however the colonies were morphologically similar. (73)

Smentkowski, Chelsey¹*, M. Dana Harriger¹, Deborah S. Austin¹, and Gaurav Deshmukh². ¹Wilson College, Chambersburg, PA 17201. ²Meso Scale Discovery, Gaithersburg, MD 20877. *The Effect of Posilac® on the Concentration of Insulin-like Growth Factor-1 (IGF-1) in Bovine Milk and Serum* — Posilac®, also known as Recombinant Bovine Growth Hormone (rBGH) or Recombinant Bovine Somatotropin (rBST), is routinely used to increase milk yield in dairy cattle. Over 1/3 of American dairy cows are currently injected with Posilac® annually. Milk yield from Posilac® treated cattle increases by 10-15%, sometimes reaching as high as 40%. Studies have shown a relation between the Posilac® injection and an increase in concentration of Insulin-like

Growth Factor-1 (IGF-1). In addition, increased levels of unbound IGF-1 have been determined as a risk factor for breast, colon, and gastrointestinal cancer. The objective of this research is to determine whether Posilac® has an effect on the concentration of IGF-1 in bovine milk and serum. Milk and serum samples were drawn from 12 cattle (organic, commercial, and commercially raised, injected cattle). Sample IGF-1 quantification was determined by electrochemiluminescent immunoassay (ECL), using a Sector Imager 2400. (66)

Smith, Jay N.* Salt Water Solutions. 2600 Laveville Road, Avon, NY 14414. *Crystallization – A Viable and “Green” Solution to Industry’s Wastewater Needs* — Treatment and disposal of multi-chloride brine flowback and production water from high-volume hydraulic fracturing of wells drilled is recognized as one of the major technical and regulatory obstacles to full-scale development of the Marcellus Shale play. In view of the April 2011 request by the DEP not to process Marcellus Shale frac wastewater in Commercial Waste Treatment Plants and the increasing TDS of late flowback and production brine, Regulators and industry both realize that new technology is increasingly necessary to treat this growing problem. This problem is further exacerbated because of recent seismicity events attributed to deep well injection along with insufficient capacity and limited suitable geologic conditions in the northeast PA and NY state. The wastewater treatment industry is responding with improvements in recycle and return, but the water chemistry and volume have proved to be problematic and progress toward building an adequate system of treatment facilities has been slow. One of the major factors in wastewater treatment is the transportation costs that have driven the cost of wastewater disposal up. The location of multiple medium sized fixed crystallization plants appears to be an applicable solution to the transportation costs. The technology that creates saleable products offsets the processing costs and makes this option a “green solution” to the disposal problem, unlike other treatment and disposal options that create large volumes of material that must be landfilled for disposal. A crystallizer that is properly designed and operated can treat flow back water and produce beneficial products that include distilled water, a calcium rich brine product for de-icing and road stabilization, and commercial high purity salt products. Crystallizer plants offer a “green option” that will be an important resource to gas producers and other treatment operations as the natural gas industry continues to develop shale gas resources. (6)

Snyder, Dillon* and Jeffrey D. Newman. Lycoming College, Williamsport, PA 17701. *A Novel *Pedobacter* Species Isolated from a Freshwater Creek* — Strains R20-19 and R20-25 were isolated from a freshwater creek in central Pennsylvania and form round pink colonies approximately 1.5mm in diameter after 48 hours at 25°C on R2A medium. Analysis of the 16S rDNA sequence suggested that R20-25 is likely a strain of *Pedobacter yonginense*, and that R20-19 is most closely related to two freshwater species of *Pedobacter*, *P. al-*

luvionis and *P. agri*, and one soil-borne species, *P. borealis*. The 16S rRNA pairwise similarity between R20-19 and the most closely related species is 97.6%. The metabolic profiles obtained with Biolog GenIII plates reveal that R20-19 differs from its closest relatives in that R20-19 cannot hydrolyze D-glucuronic acid or Tween 80 while *P. agri*, *P. alluvionis*, *P. borealis* can. R20-25 can, and that R20-19 is capable of hydrolysis of L-Malic acid while *P. agri*, *P. alluvionis*, and *P. borealis* cannot. Due to phenotypic and molecular distinctiveness, it is hypothesized that R20-19 is a novel species within the genus *Pedobacter*. (71)

Sohle, Brittany* and Garrett Barr. King’s College, Wilkes-Barre, PA 18711. *Use of Cover by Prey in Response to Single and Multiple Predator Species* — The objective of our study was to measure the use of cover by stream macroinvertebrates (heptageniid mayfly nymphs) in the presence of a benthic predator (larval two-lined salamanders, *Eurycea bislineata*) and an epi-benthic/drift-feeding predator (brook trout, *Salvelinus fontinalis*) singly and together. We measured mayfly cover use in 24 hour trials in 38-liter glass tanks. The number of mayfly nymphs using cover was highest in the presence of trout and intermediate with both predators ($p = 0.001$). Use of cover was higher during the day than night ($p = 0.003$), though the significant interaction between the predator and the time of day treatments ($p = 0.027$) shows that although the mayflies tended to use cover more often during the day, this was not the case in the presence of only salamanders. (42)

Sontag, Thomas* and Jeff Newman. Lycoming College, Williamsport, PA 17701. *The Assembly and Annotation of the *Chryseobacterium haifense* Genome* — Several phenotypic and molecular observations had raised questions about the phylogenetic position of *C. haifense*. To resolve the issue, its genome was sequenced using Ion Torrent Technology. The reads were assembled using a combination of NextGene and Geneious software programs. Artemis and Rapid Annotation Using Subsystem Technology (RAST) were used to order the assembled contigs. Protein coding genes were identified in different subsystems using RAST. Resistance to β -lactam antibiotics was confirmed by the presence of various β -lactamases. *C. haifense* was described as producing flexirubin pigment; however our phenotypic analysis did not detect the pigment and the genome does not contain flexirubin biosynthetic genes. Average nucleotide identity to orthologs in *C. gleum*, the type species for the genus, suggests that *C. haifense* should be classified in a different genus. (108)

Spacht, Drew* and Michael A. Elnitsky. Department of Biology, Mercyhurst University, Erie, PA 16546. *The Impacts of Climate Change on the Overwintering Energetics and Microenvironmental Conditions of the Goldenrod Gall Fly, *Eurosta solidaginis** — 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 to freeze tolerant during fall and, at our field site in Pennsylvania, enter diapause during mid-to late-October. These larvae then remain dormant throughout winter relying on accumulated lipids and glycogen as metabolic substrates. The winter temperatures experienced by the larvae directly influence the potential fecundity of the adults, as the energy reserves remaining at the end of winter determine body size and are used for gamete production in the flies. Therefore, the purpose of the present study was to assess the current and future impacts of climate change on the overwintering energetics and microenvironmental conditions experienced by *E. solidaginis* larvae. We used historical temperature data to estimate the overwintering (November through March) energy used by larval gall flies. Based upon the relationship between metabolic rate and temperature, the estimated energy utilization during winter has increased by nearly 30% over the last 50 years. Each additional 1°C rise in temperature is predicted to increase overwintering energy consumption by ~13%. Continued climate change will also have significant impacts on the winter thermal microenvironment of *E. solidaginis*. Elevated winter temperatures are predicted to significantly decrease the number of freeze-thaw cycles, the average time spent frozen per cycle, the total time spent frozen during winter, and the minimum winter temperature experienced by the larvae. (113)

Sparno, Nicole* and **André P. Walther**. Cedar Crest College, Allentown, PA 18104. *Development of a PCR-based Assay to Measure Telomere Length and Structure in Saccharomyces cerevisiae* — Telomeres are non-coding DNA sequences found at the ends of chromosomes that act like protective caps for the genes that are located near the ends of chromosomes. Telomere length is tightly regulated in human cells and improper regulation of telomere synthesis is a hallmark of human cancers. To better understand human cancers our lab is examining the mechanism of telomere synthesis during replication by the enzyme telomerase in the budding yeast *Saccharomyces cerevisiae*. One protein thought to be involved in regulating telomeres is the singled-stranded DNA binding protein Replication Protein A (RPA) that is known to localize at telomeres. RPA is phosphorylated in a cell-cycle dependent manner and in response to DNA damage, suggesting that phosphorylation may play a role in regulating telomere synthesis. To understand the role of RPA phosphorylation in regulating telomeres, we have been developing a PCR-based assay to isolate and amplify telomeric sequences from yeast strains containing mutations in RPA phosphorylation sites. These amplified telomeres will be analyzed by DNA gel electrophoresis to determine differences in telomere length and characterized by DNA sequencing to identify changes in telomeric structure. By carefully examining the changes in telomere structure caused by mutant forms of RPA, we will gain insights into the regulation of telomere length in yeast and humans. (134)

Spitz, Mia*, **Stacy Nganga***, **Laurie F. Caslake**, and **John O. Drummond**. Lafayette College, Easton, PA 18042. *Microbes in Cosmetics: Piloting a Microbial Investigation for the General Biology Laboratory* — The general biology laboratory curriculum at Lafayette College includes a three-week module culturing microbes on a variety of media. As previous general biology students, our goal was to pilot a microbial investigation that could be used as a replacement for a microbe currently being investigated in the module. Burleson and Martinez-Vaz (2011) developed a laboratory exercise attempting to culture microbes from a variety of cosmetics. To determine the feasibility of incorporating their laboratory exercise into the Lafayette College general biology curriculum, we followed their protocol, testing five cosmetic products (lip balm, deodorant, body lotion, mascara, and petroleum jelly) on four different agar media: NA, MSA, EMB, and SDA. A dry sample from each product was streaked onto each medium followed by 1:10, 1:100, and 1:1,000 Tween-peptone dilutions on each medium for a total of 160 plates. All plates were incubated at 37°C for 48 hours. Over 100 colonies were cultured on all media from the body lotion. By comparison, the deodorant yielded a maximum of 32 colonies, but only on nutrient agar and only after an incubation time exceeding the protocol. No other product yielded more than 32 colonies. Due to minimal bacterial growth and the complexity of the procedures, it was concluded that this laboratory exercise would not be an appropriate addition to the current general biology laboratory module. (152)

Staretz, Marianne and **Alexis Hightman***. Cedar Crest College, Allentown, PA 18104. *Solvent Effects on the Absorption and Fluorescence Spectra of Cocaine and Common Cutting Agents* — Cocaine is a schedule II drug and is susceptible to high abuse. Cocaine also has a history of medical use. Though it is not common practice now, cocaine was once used as an anesthetic. Ultraviolet-visible and fluorescence spectroscopy are techniques commonly used in the analysis and characterization of molecules. In this study, cocaine and common cutting agents (benzocaine, procaine, tetracaine, and lidocaine) were analyzed using both ultraviolet-visible spectroscopy and fluorescent spectroscopy in a variety of solvents. The goal was to find spectral differences for cocaine within or across solvents that could be useful in the analysis of mixtures of cocaine and these common cutting agents. Various solvents, six in total, were used to analyze the solvent effects on spectra of cocaine and common cutting agents. Solutions of a 0.01mg/mL concentration were prepared for each solvent. Fluorescent spectra were also obtained using the same solvents but at a 0.001mg/mL concentration. The results of these spectral analyses will be presented. (157)

Stromko, Caitlyn* and **Karl Kleiner**. York College of Pennsylvania, York, PA 17403. *Do Female Northern Saw-whet Owls (Aegolius acadicus) Escort Their Offspring During Annual Fall Migration?* — The post-fledging dependence period is defined as the period of time in which the juveniles

of some bird species may continue to depend on their parents for learning important social interactions, foraging strategies, and migratory behavior. Migratory birds sometimes maintain post-fledging kin associations to structure the formation of their flocks. Terns, cranes, geese, swans, and other waterfowl are known to migrate together in family groups of parents and young. Some raptor species maintain parent-offspring connections during the post-fledging period near their natal nest site, but it is poorly understood whether these associations persist during the migratory period. The parent-offspring associations of migratory owls are unknown. In this study, we used a genetic analysis to examine fall migrating Northern Saw-whet Owls (*Aegolius acadicus*) from Pennsylvania and California to answer the question: do female Northern Saw-whet Owls escort their offspring during annual migration? A 711 nucleotide base pair fragment of the tRNA-Glu/control region of the mitochondrial DNA was used to detect closely related individuals. No owls captured in the same net check or on the same night yielded the same genetic sequence. Based on our sampling, it does not appear that juvenile Northern Saw-whet Owls are accompanied by their mothers during their first fall migration, suggesting that migratory behavior is instinctual rather than learned. (103)

Tumminello, Richard*, **Tara Brennan***, and **Sheryl Fuller-Espie**. Cabrini College, Radnor, PA 19087. *Heat Shock Induces ROS Production and Histone Phosphorylation in Coelomocytes of Eisenia hortensis* — We investigated the effects of heat shock on earthworm coelomocytes (leukocytes) by measuring the production of reactive oxygen species (ROS), the phosphorylation of H2AX histones, and the hydroxylation of guanines (8-OHdG) in DNA as indicators of oxidative stress and DNA lesions. After culturing coelomocytes at temperatures ranging from 20°C (control) to 35°C for 8 h, reactive oxygen species (ROS) levels were measured using a flow cytometric method employing dihydrorhodamine 123 for ROS detection and 7-aminoactinomycin D as a viability stain. We observed that ROS production increased significantly ($p < 0.05$) and reproducibly at temperatures of 30°C and 35°C. We also observed that heat stress at 30°C, 32.5°C, and 35°C for 12-16 h resulted in phosphorylation of H2AX histones. Phosphorylation of H2AX histones in chromatin proximal to double strand breaks in DNA is an indicator of DNA damage. We used antibodies specific for phosphorylated serines in H2AX histones and flow cytometric analysis. Comparing controls to heat stressed samples using three separate assays consisting of batched coelomocyte samples of approximately seven earthworms per batch confirmed H2AX phosphorylation ($p < 0.05$). In addition, preliminary results suggest that heat stress under these conditions is not causing significant oxidative damage of DNA; antibodies specific for 8-OHdG, an indicator of DNA oxidation, showed no difference between control (25°C) and heat stressed (30°C, 32.5°C and 35°C) samples during an 18 h incubation. This might be explained by high levels of artifactual oxidation of DNA as-

sociated with aerobic sample collection, fixation and processing, making it difficult to discern subtle differences between the control versus treatment groups. Alternatively, the level of ROS production may be insufficient to cause demonstrable accumulation of 8OHdG because of highly effective antioxidant mechanisms operating over this time period. Collectively, these results emphasize the importance of selecting appropriate temperatures for culturing invertebrate cells when conducting in vitro assays in order to minimize oxidative stress, and the possible cellular effects of heat stress in soil ecosystems associated with global warming events. (24)

Tymochko, Larae* and **Michael A. Elnitsky**. Department of Biology, Mercyhurst University, Erie, PA 16546. *Oxidative Stress During Freezing and Thawing in the Freeze-tolerant Woolly Bear Caterpillar, Pyrrharctia isabella* — Increased production of reactive oxygen species (ROS) may overwhelm antioxidant systems resulting in oxidative damage to cellular membranes, proteins, and nucleic acids. Freeze-tolerant ectotherms may experience such increased production of ROS and oxidative stress during frequent freeze/thaw cycles. Therefore, the purpose of this study was to investigate the effects of subfreezing temperature exposures on the metabolic rate, cell viability, and measures of oxidative stress in freeze-tolerant woolly bear caterpillars, *Pyrrharctia isabella*. Following freezing, a slight decrease in the rate of oxygen consumption was observed at 1 and 5 h post-thaw, suggesting the organisms may reduce metabolic rate in an attempt to limit ROS production. However, lipid peroxidation was significantly elevated at 4 h post-thaw, demonstrating the caterpillars did still incur an oxidative stress. At 24 and 48 h post-thaw, the rate of oxygen consumption was markedly increased, while lipid peroxidation was significantly lower, perhaps as a result of the activation of cellular repair mechanisms. Cell viability remained high following the freeze/thaw, suggesting the oxidative stress did not compromise membrane integrity of fat body tissue. These results provide insight into the nature of freeze/thaw injury and the mechanisms used by naturally freeze-tolerant species to limit and repair oxidative damage. (114)

Vail, Caroline*, **Adin Kugelmass**, and **Robert Kurt**. Lafayette College, Easton, PA 18042. *The Culturing and Immortalization of Murine Fallopian Tube Secretory Cells as a New Method of Studying Ovarian Cancer* — Recent literature has pinpointed a new point of origin of ovarian cancer besides the ovary. Previous studies have determined that high-grade serous ovarian cancer, responsible for 70% of ovarian cancer deaths, initiates in the Fallopian tube. More specifically, it is believed that the cell type of origin is the Fallopian tube secretory cell (FTSEC), the function of which is largely unknown. Based on a protocol from Dana Farber Cancer Institute in Boston, MA where researchers Alison Karst and Ronny Drapkin grew and immortalized human FTSECs, this study attempts to create a mouse model *in vitro*. Murine FTSECs were grown successfully in primary culture for well

over two weeks. Upregulation of murine telomerase reverse transcriptase (mTERT) and downregulation of p53 and cyclin-dependent kinase 4 (CDK4) were attempted to immortalize the FTSECs. Quantitative polymerase chain reaction (qPCR) will determine the presence of the aforementioned biomarkers. The most efficient dose of plasmid used to immortalize FTSECs will be chosen based on a time and dose gradient. Upon immortalization, FTSECs can be used to study cell-cell signaling and other initiation events to more effectively study a particularly deadly form of cancer. (20)

Vrakas, Christine* and **Robert Kurt.** Lafayette College, Easton, PA 18042. *The Measure of Damage Associated Molecular Pattern Molecules and Their Role in Recruiting Suppressor Cells in Tumor Bearing Mice* — The purpose of this study was to measure the relative expression of damage associated molecular pattern molecules (DAMPs), regulatory T cells (Tregs) and myeloid derived suppressor cells (MDSC) in mice at various stages of breast cancer to determine whether there is a relationship between DAMP expression and recruitment of these cells to sites of metastasis. Initially six DAMPs were screened in the brain, liver, and lung tissues of naive, female mice. Quantitative polymerase chain reaction (QPCR) was done on tissue samples and revealed that S100A8 and HSP70A1B had higher expression in the lungs, where the highest level of metastasis also occurs. Next, we measured the relative expression of DAMPS, Tregs, and MDSC from lung tissue. This was done in four-week increments, starting when the mice were injected with cancer. By isolating the lungs from the tumor bearing mice and running QPCR the relative expression of DAMPS, Tregs and MDSC could be followed over time. Data suggest that the DAMP, S100A8, and the MDSC marker CD11b, had the highest relative expression at day 21 of breast cancer. This led to the decision to isolate lung tissue at day 21, and use magnetic cell separation to obtain a homogenous population of CD11b⁺ cells. Following cell separation the cells were further characterized using QPCR, flow cytometry, and we are in the process of running functional assays such as phagocytosis and chemotaxis assays. Results from this study may reveal if there is a connection between DAMPS and recruitment of suppressor cells to sites of metastasis and how the element of tumor development over time impacts the levels of these cells at metastatic sites. (125)

Vranicar Kutch, Jennifer* and **Terry L. Master.** East Stroudsburg University, East Stroudsburg, PA 18301. *Habitat Preference of the Hooded Warbler (*Setophaga citrina*) within Delaware Water Gap National Recreation Area* — This study focuses on Hooded Warbler abundance within three different understory habitats. These habitats include an understory dominated by; (1) native shrubs and trees; (2) non-native Japanese Barberry (*Berberis thunbergii*); and (3) a mixture of native shrubs and *B. thunbergii*, both common to the edge of a barberry patch. To evaluate Hooded Warbler habitat preference, ten-minute point counts were conducted

within ten 2 km² blocks chosen in a stratified random manner, each containing 3 plots representing each understory habitat, on the Pennsylvania and New Jersey sides of the Delaware Water Gap National Recreation Area. The frequency and number of males singing were recorded in all three plots within each block. In the 2011 and 2012 field seasons, there were significantly more males heard within barberry habitat, than in native understory habitat. The 2012 field season also focused on a survey of the general avian community within these plots, where species richness and diversity were both higher within native habitats compared to barberry-dominated habitats. Analysis of trees and shrub composition and structure within the plots showed that there was a difference in composition of the vegetation between barberry-dominated and those plots dominated by native understory. (104)

Warner, Tyler P.*, Ronald P. Hart, Jennifer C. Moore, and **Melissa Boldridge.** Rutgers University, Piscataway, NJ 08855. *Identifying the Molecular Mechanisms Underlying the Reduced Reprogramming Efficiency of Ataxia Telangiectasia Mutated Cells* — Ataxia Telangiectasia Mutated (ATM) has been studied by many for its implication in cancer as a master regulator of the cell cycle; however, recent studies have shown great difficulty in forming induced pluripotent stem cells (iPSCs) from the cells of Ataxia Telangiectasia (AT) patients. Here, we assessed the reliability of transient expression of ATM during iPSC formation as a rescue. Preliminary results suggest the addition of EZH2 to wildtype mEFs increases reprogramming efficiency. It was also confirmed that RepSox, a drug mimic of Sox2, increases both ATM and EZH2 expression. From these experiments we concluded that, in order to prevent premature senescence, ATM knockout mEFs need to be passaged minimally and seeded densely. *Danio rerio*, a more robust early development and neurobiological model organisms shows promise for further AT research. (139)

Williams, Emma*. Morris Arboretum, Philadelphia, Pennsylvania 19118. *A Similarity Comparison of Extant Vegetation to the Soil Seed Bank in the Natural Lands Section of the Morris Arboretum* — Current management goals of the natural lands section of the Morris Arboretum revolve heavily around invasive species control. One of the most prolific invaders is reed canarygrass (*Phalaris arundinacea*), a cool season perennial grass. Reed canarygrass has formed a thick monoculture in a section of the meadow that experiences seasonal inundation of Wissahickon Creek flood waters and is spreading to adjacent areas within the floodplain meadow. Heavy seeding and planting with natives is recommended following removal of reed canarygrass to prevent re-establishment through competition (Wisconsin Reed Canary Grass Management Working Group, 2009). This project seeks to quantify and compare the species composition of the extant vegetation and the soil seed bank to assess environmental sources of native viable propagules for restoration. Species richness and relative percent cover were measured in plots

placed in both the reed canarygrass dominated and adjacent uninvaded areas in the floodplain as well as the sloping upland section of meadow. Associated soil cores were collected at 5-cm depth increments to 15-cm, cold stratified, and assayed for viable seed in a controlled greenhouse. Viable seed reduced with depth in the soil column. Samples taken in the reed canarygrass section of the meadow exhibited higher species richness than the associated extant vegetation and canarygrass seedling abundance reduced with depth. Knowledge of the components of the soil seed bank allows for management actions designed to promote target restoration species while controlling against invasives. (15)

Williams, Stephanie I.*, **Pablo R. Delis**, and **Walter E. Meshaka Jr.** Shippensburg University, Shippensburg, PA 17257. *Female Reproductive Biology of Marbled Salamanders, Ambystoma opacum, in a Population of South Central Pennsylvania* — Amphibians are bioindicators, reflecting the health of the environment they occupy and their reproductive success is a reflection of their demographic health. The Marbled Salamander, *Ambystoma opacum*, is a species native to Pennsylvania. Contrasting with other Ambystomatids, Marbled Salamanders are fall breeders and oviposit on dry land instead of in water. This study examined the reproductive biology and timing of female Marbled Salamanders in south-central Pennsylvania by determining morphological, egg, and larvae characteristics of a breeding population in 2012. In September, we set up two 15-cover grids in two adjacent vernal pools, North Fence Pond and Missile Pond. Covers were checked biweekly for the presence of female salamanders, eggs or larvae. Additionally when pools filled, we determined the presence and density of larvae by dip netting biweekly. All captured females were gravid at both breeding sites: three at North Fence Pond and 38 at Missile Pond. Covers were not successful in attracting females since only one female with her clutch, under a cover was found in Missile Pond. Clutch size was estimated at 80 eggs. Egg deposition took place days after migration while larvae appeared six weeks later. No larvae were found at North Fence Pond, while Missile Pond larvae showed a density of 2.11 larvae/liter. North Fence Pond had a shorter and more sporadic hydroperiod than Missile. Differences in female numbers and absence of larvae suggest that North Fence may not be an actual breeding site and that the captured females were actually migrating to Missile Pond. (164)

Williams, Varma-Rose* and **Heather Sahli**. Shippensburg University, Shippensburg, PA 17257. *Does the Enemy Release Hypothesis Explain the Success of Invasive Species in Pennsylvania?* — Invasive plant species are those exotic species that have become dominant in their introduced habitat, often negatively impacting native species. Understanding why invasive plant species are at an advantage in their introduced habitat rather than their native habitat could help us develop the tools to control invasive species. The Enemy Release Hypothesis is one hypothesis that could explain why in-

vasive species become dominant in their introduced habitat. If introduced plant species have no herbivores to consume them, the introduced species may increase their reproduction and expand without limitation. If enemy release is taking place, we would expect invasive species to have fewer herbivores and less damage than closely related native species. We tested whether the Enemy Release Hypothesis may explain the success of three exotic plant species by comparing the percent damage of leaves and abundance and diversity of insects consuming the leaves in three invasive species and their native congeners: *Rubus pensilvanicus*/*R. occidentalis*, *Fallopia japonica*/*F. scandens*, and *Persicaria perfoliata*/*P. sagittata*. Individuals of each species were found on the campus of Shippensburg University with the invasive and native congeners growing in the same habitat. Results from this research will determine the extent to which release from enemies can explain the success of these three invasive species in South Central Pennsylvania. (13)

Wilson, Stephanie*. The Morris Arboretum of the University of Pennsylvania, Philadelphia, PA 19118. *A Survey of Wild Bees (Hymenoptera: Apoidea) in Philadelphia, Pennsylvania* — This study is part of a larger USGS survey of the bees in the United States as part of a monitoring program of the flora and fauna of North America. While bees have been studied across Pennsylvania and in New York City and Baltimore, this is the first documented survey of the bees of Philadelphia. Bees were sampled by netting once in July, August, and September. A total of 64 bees and 22 species were captured. Three species were not native to North America. This is the first record of *Ceratina mikmaqi* (Rehan and Sheffield) and *Coelioxys coturnix* (Pérez) for Philadelphia and Pennsylvania. This is the second record of *Megachile apicalis* (Spinola) for Pennsylvania and the first record for Philadelphia. This is the first record of *Lasioglossum coriaceum* (Smith) and *Megachile pugnata* (Say) for Philadelphia. I surveyed wild bees in Philadelphia in order to monitor for introductions of new species and characterize bee fauna in an urban area. (16)

Wingert, Daniel*, **Kevin Wile**, **Victoria Himmelberger**, and **Lawrence Mylin**. Messiah College, Mechanicsburg, PA 17055. *A Bacteriophage Neutralization Exercise for a Microbiology for Health Professions Course Laboratory* — We have developed a laboratory exercise to demonstrate viral tropism, antigen-specific neutralization, and differences in antibody titer among patient sera using infection of two *Escherichia coli* strains by the bacteriophages T4 and ΦX174 using materials obtained from Carolina Biological Supply. T4 and ΦX174 efficiently infect, respectively, *E. coli* B and C strains, and immune goat serum neutralizes the T4 phage but not the ΦX174 phage. Multiple variables were addressed. Strain-specific infection by the phages T4 and ΦX174 was verified. Phage stocks were titrated to determine the ideal concentration required to obtain optimal starting numbers of well-separated plaques; concentrations of the two phages re-

quired to achieve optimal plaque numbers varied due to dramatic differences in plaque size. The optimal concentration (dilution) of goat serum required to inhibit infection by T4 and a suitable time for neutralization of the T4 phage particles were determined. Similar concentrations of the T4-specific serum did not interfere with plaque formation by the ΦX174 phage. Using such parameters, a procedure was written in which three pairs of students would perform portions of a larger investigation. T4-specific antiserum is provided at two different concentrations to represent patient sera (John & Lucy) containing different titers of neutralizing antibodies. Two student groups would prepare parallel serial dilutions of these sera, and test a pre-determined volume of each dilution for reduction of plaque formation. A third group would test the highest three concentrations of each dilution series to assure that the same sera do not interfere with infection by a second virus, ΦX174. By counting the numbers of plaques produced, students should determine which patient had the higher titer of circulating phage-specific antibodies, can calculate the relative difference in antibody concentration between patient sera, and confirm that protection was virus strain-specific. (174)

Wolff, Jacob*. University of Pittsburgh at Johnstown, 450 Schoolhouse Road, Johnstown, PA 15904. *Where the Freight Trains No Longer Stop: Deindustrialization, Environmental and Economic Effects, and Community Response in Johnstown, Pennsylvania* — The focus of this study is to analyze the economic, environmental, and social effects of deindustrialization processes within the Johnstown, Pennsylvania Metropolitan Statistical Area and build an understanding of how physical setting has influenced regional decline and recovery over the past two decades. Johnstown, Pennsylvania has been in the process of deindustrializing since the 1977 flood that caused major damage to Bethlehem Steel facilities, regional infrastructure, and city homes and businesses. Bethlehem Steel, the primary employer of the area, began reducing operations over a fifteen year period following the flood. The region suffered through this period of underemployment and population loss while maintaining several environmental, re-developmental, and community action programs to cope with declining industry. Spatial relativity to surrounding communities by means of physical barriers and cumbersome transportation systems has functioned as a factor in the Johnstown MSA's inability to recover from two decades of decline. Data analysis varies from quantitative means with US Census demographic and economic figures to qualitative approaches drawing upon interviews with local residents and officials. (171)

Yousif, Aziz^{1*}, Jingyi Zhang¹, Francis Mulcahy², and Om V. Singh¹. ¹Division of Biological and Health Sciences, ²Department of Chemistry University of Pittsburgh at Bradford, Bradford, PA, 16701. *Isolation and Characterization of Indigenous Microorganisms from Cave Soil Cultivated in an Electromagnetic Field* — Microorganisms that prevail in rare

earth habitats have promising biotechnological implications due to their genomic stability and ability to grow under adverse environmental conditions. In an attempt to simulate such conditions, an electromagnetic field (EF) of 100 Gauss was employed to better understand the microbial growth and metabolic cascades controlling biochemical pathways. We hypothesized that the EF would biostimulate natural microbial flora (*i.e.* Bacteria and Fungi) of mineralized caves leading to bioconversion of products of commercial significance. Three unique microorganisms were isolated under the EF from nutrient broth (NB) enriched cave soil. The microorganisms were identified and designated as *Streptomyces sp.*-EF1, *Arthrobacter sp.*-EF2, and *Bacillus sp.*-EF3 using 16S rRNA sequencing. Microorganism *Streptomyces sp.*-EF1 revealed a dark brown color on nutrient agar (NA) plates resembling melanin, an ultra-violet protectant and antioxidant. The presence of melanin was confirmed by the formation of a dark brown color on L-tyrosine supplemented NA plates and thin-layer chromatography (TLC) using synthetic melanin as a standard. The biostimulation of *Streptomyces sp.*-EF1 revealed increased levels of melanin formation under an electromagnetic field compared to the control (non-electromagnetic conditions) samples in NB and other supplied carbon sources. The GC-MS profile of *Streptomyces sp.*-EF1 under magnet field versus non-magnetic field revealed varying levels of microbial metabolic products. (116)

Yurko, Danielle¹, Kendra Spears^{1*}, Rick Stahl², David Carey², and Angela Asirvatham¹. ¹Misericordia University, Dallas, PA 18612, ²Weis Center for Research, Geisinger Clinic, Danville, PA 17822. *The Influence of Phosphorylated-Akt/PKB on the Expression of A-Kinase Anchoring Proteins in Mitogen-Stimulated Neonatal Rat Schwann Cell Cultures* — Development of the peripheral nervous system is dependent upon the proliferation of Schwann cells which are mediated by the heregulin/neuregulin family of growth factors secreted by neurons. Heregulin stimulates Schwann cell division in a synergistic fashion only if signaling pathways involving cAMP are also triggered. The mechanisms mediating this synergistic modulation are unknown. Previous studies have revealed that A-Kinase anchoring proteins (AKAPs) of the cAMP/PKA pathway play an important role in Schwann cell proliferation. Preliminary experiments have shown that treatment of neonatal rat Schwann cells with oligos synthesized against AKAP150 and AKAP95 caused a reduction in protein expression of AKAPs, accompanied by a decrease in expression of the cell survival signal, Akt/protein kinase B. This study was undertaken in order to determine if there was a relationship between the expression of AKAPs and phosphorylation of Akt when Schwann cells were treated with heregulin and the cAMP activator, forskolin. To perform this study, neonatal rat Schwann cells were cultured with no mitogens followed by incubation with heregulin, forskolin or heregulin and forskolin. Immunoblot analysis of Schwann cells incubated with heregulin revealed an upregulation of

AKAP95 and phospho-Akt, while treatment with forskolin significantly increased the expression levels of AKAP150 and Akt. Moreover, the percentage expression of phospho-Akt over Akt in Schwann cells increased when stimulated with mitogens. Overall, the protein levels of both AKAP95 and AKAP150 were altered with mitogenic stimulation. The above observation suggests that there may be a relationship between expression of AKAPs and phosphorylation of Akt when Schwann cells are stimulated with mitogens to mediate cell proliferation. (140)

Zhang, Jingyi*, Aziz Yousif, Francis Mulcahy, and Om V. Singh University of Pittsburgh at Bradford, Bradford, PA 16701. *Analysis of β -carotene Production by *Gordonia* sp.-SD4 Isolated from Cave Soil* — Synthetic coloring of food and their possible consequences on human health has increased the demand of natural pigments. The β -carotene is widely used as color additive in food industry, and is approved as a Generally Recognized as Safe (GRAS) substance (21CFR184.1245) by the FDA. We hypothesized that the microorganisms found under rare earth habitats would reveal products of commercial significance. The nutrient broth (NB) enriched cave soil samples revealed total of 20 colonies on nutrient agar (NA) plates designated as SD1-SD20. Colonies that revealed red, pink and yellow color were purified by the single cell isolation method, and identified using 16S rRNA sequencing. One of the pink colonies, SD4 revealed 99.28% similarity to *Gordonia* sp. at the Ribosomal Database Project (release 10) and EzTaxon version 2.1 databases. The intracellular red coloration *Gordonia* sp. SD-4 was extracted by acetone, and identified by Thin-Layer Chromatography (TLC). The Rf value of standard β -carotene corresponded to one of the eight bands observed on the TLC chromatogram. The absorbance of the extract was measured at 436nm, and concentration of β -carotene was calculated using the Beer-Lambert Law. Among various carbon sources supplied to *Gordonia* Sp.-SD4, glucose and dextrose resulted in the highest production of β -carotene. (154)

Zimmerman, Mel*. Lycoming College, Williamsport, PA 17701. *Contribution of Lycoming College Clean Water Institute to PFBC Unassessed Waters Project, 2010-2012* — Pennsylvania's water resource consists of 86,000 miles of flowing water. To date PA Fish and Boat (PFBC) has surveyed over 12,000 miles as wild trout streams leaving significant numbers unassessed. Without documentation it is difficult to protect these waters during the permitting process of urbanization and the recent expansion of Marcellus Shale Gas Extraction. Since 2010 the Lycoming College Clean Water Institute (CWI) has completed 230 stream surveys following PFBC protocols to assess reproducing trout populations in headwater streams in three major North Central PA watersheds (Loyalsock, Lycoming and Pine creeks). Through population estimates the biomass class can be assigned to a stream, according to PFBC's criteria. Stream classifications range from Class A (biomass of at least 30 kg/ha) and Class

B (at least 20 kg/ha), down to class E (no trout). In addition, macro invertebrate diversity (RBA protocols) were done on many of the Class A / B streams. Results show that over half of the streams sampled support reproductive populations of brook and/or brown trout. The success of this program provides not only classification and protection of meeting Cold Water Fishes (CWF) designation in 25PA Code Chapter 93, but also baseline data for continued monitoring of current and future impacts in these watersheds. (37)

Zimmerman, Mel*, Jonathan Niles, Brian Mangan, and Michael Bilger. Lycoming College, Williamsport, PA 17701, Susquehanna University, Selinsgrove, PA 17870, Kings College, Wilkes-Barre PA 18711 and EcoAnalysts, Selinsgrove, PA 17842. - *Pennsylvania Unassessed Waters initiative: Role of SRHCES in Protection of Headwater Streams in North Central PA Watersheds* — Pennsylvania's water resource consists of 86,000 miles of flowing water. To date PA Fish and Boat (PFBC) has surveyed over 12,000 miles as wild trout streams leaving significant numbers unassessed. Without documentation it is difficult to protect these waters during the permitting process of urbanization and the recent expansion of Marcellus Shale Gas Extraction. In 2010, two partners (Lycoming College and King's College) of the Susquehanna River Heartland Coalition for Environmental Studies (SRHCES- a consortium of 6 College/Universities and Geisinger Environmental Health Center) were trained to follow PFBC protocols in electrofishing and water sampling. By 2012, SRHCES partner schools grew to four (with addition of Susquehanna and Lock Haven Universities; out of 15 statewide) and over 2,000 streams have been processed for their ability to support trout (1,086 by partners including over 600 by SRHCES and an additional 848 by PFBC/DEP staff). In addition, macro invertebrate diversity (RBA protocols) were done on many of the Class A / B streams. Results show that over half of the streams sampled support reproductive populations of brook and/or brown trout. The success of this program provides not only classification and protection of meeting Cold Water Fishes (CWF) designation in 25PA Code Chapter 93, but also baseline data for continued monitoring of current and future impacts in these watersheds. (7)