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88th Annual Meeting

of the

Pennsylvania Academy of Science

March 30 - April1, 2012

Cedar Crest College

Allentown, PA

Journal of the Pennsylvania Academy of Science 86(2): 80-82, 2012

SCHEDULE OF ACTIVITIES AT A GLANCE

88th Annual Meeting of the Pennsylvania Academy of Science

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

Friday, March 30, 2012

3-5:00	Field Trip(s)	Hawk Mountain
4-6:00	Board Meeting	President's House
6-7:00	Board Dinner	President's House
6-9:00	Da Vinci Social Mixer	Da Vinci

Saturday, March 31, 2012

9:00 am – 12:00 pm	**Symposium: Conservation and Ecology of Pennsylvania's Bats**	Miller 33
9-10:30	**Oral Presentations**	
	I. Cancer Biology I	SC 136
	II. Cell & Developmental Biology	OBC 1
10:30-10:45	Break	Lee's Gym
10-12:00	**Poster Session I: Cell Biology**	Lee's Gym
10:45-12:00	**Oral Presentations**	
	III. Aquatic Ecology I	SC 136
	IV. Education	SC 139
	V. Animal Physiology	OBC 1
12-1:30	Lunch + Business Meeting	SC 136

	Lunch + Women in Science Careers Panel	OBC 1
	Lunch + Grad School and NSF Fellowships	Miller 33
1:30-2:30	Faculty Data Blitz	SC 136
2:30-2:45	Break	Lee's Gym
2:30-4:30	**Poster Session II: Explorations in Science**	Lee's Gym
2:45-4:00	**Oral Presentations**	
	VI. Algal Biology	Miller 33
	VII. Animal Ecology	SC 136
	VIII. Genetics	OBC 1
4-6:00	Social Mixer (off-site)	Pistachio's
6-9:00	Dinner + Keynote	HBB

Sunday, April 1, 2012

8-9:00	Board Meeting	SC 138
9-10:30	**Oral Presentations**	
	IX. Plant Interactions	Miller 33
	X. GIS/Ocean Systems	SC 136
	XI. Parasitology	OBC 1
10:30-10:45	Break	Lee's Gym
10-12:00	**Poster Session III: GIS, Ecology, and Environmental Biology**	Lee's Gym
10:45-12:00	**Oral Presentations**	
	XII. Phage Biology	SC 139
	XIII. Aquatic Ecology II	Miller 33
	XIV. Cancer Biology II	SC 136

	XV. Forensics	OBC 1
12-1:00	Awards Ceremony and Lunch	OBC 1

Journal of the Pennsylvania Academy of Science 86(2): 83-97, 2012

PROGRAM SESSIONS

88th Annual Meeting of the Pennsylvania Academy of Science
Cedar Crest College, Allentown, PA

March 30 – April 1, 2012

Program Chairs
Alyssa Bumbaugh and Heather Sahli

SYMPOSIUM

SATURDAY, MARCH 31

9:00-12:00

CONSERVATION AND ECOLOGY OF PENNSYLVANIA'S BATS

MILLER 33

Howard Whidden, Session Chair

9:00 – 9:10

1. *Introduction to the Symposium*. **Whidden, Howard*.** East Stroudsburg University, East Stroudsburg, PA.

9:10 – 9:25

2. *The history of bat research in Pennsylvania*. **Hart, James A.*[1]** and **Fred J. Brenner[2].** [1]Wildlife Specialists, LLC, Wellsboro, PA; [2]Grove City College, Grove City, PA.

9:25-9:40

3. *Pennsylvania Game Commission Wind Energy Voluntary Cooperative Agreement history and survey results summary*. **Capouillez, William, Tracey Librandi Mumma,** and **John Taucher*.** Bureau of Wildlife Habitat Management, Pennsylvania Game Commission, Harrisburg, PA.

9:40-9:55

4. *Extent and Characteristics of Bat Mortality at Pennsylvania Wind Farms***. Whidden, Howard P.*, Andrew S. Zellner, Michael R. Scafini,** and **Shannon M. Williams.** East Stroudsburg University, East Stroudsburg, PA.

9:55-10:10

5. *Bat Mortality and Geographic Spread of White-nose Syndrome in Pennsylvania.* **Turner, Gregory G.*[1]** and **Brent J. Sewall[2].** [1]Pennsylvania Game Commission, Harrisburg, PA; [2]Temple University, Philadelphia, PA.

10:10-10:30

Break

10:30-10:45

6. *Appalachian Summer Bat Roost Counts in Pennsylvania.* **Butchkoski, Calvin M.*** Pennsylvania Game Commission, Petersburg, PA.

10:45-11:00

7. *Acoustic Transects for Monitoring Bat Activity in the Delaware Water Gap National Recreation Area*. **Laubach, Larry*, Megan Flynn, Danielle Mislinski,** and **Howard P. Whidden.** East Stroudsburg University, East Stroudsburg, PA.

11:00-11:15

8. *Large-Scale Analysis of Correlates of Bat Susceptibility to White-nose Syndrome and Consequences for Bat Communities*. **Sewall, Brent J.***[1] and **Gregory G. Turner[2]**. [1]Temple University, Philadelphia, PA; [2]Pennsylvania Game Commission, Harrisburg, PA.

11:15-11:30

9. *Assessing Behavioral Shifts in Bats Affected by White-nose Syndrome.* **Brownlee, Sarah*** and **Dee-Ann Reeder.** Bucknell University, Lewisburg, PA.

11:30-11:45

10. *Susceptibility and Physiology of Bats with White-nose Syndrome: Lessons from Pennsylvania*. **Reeder, DeeAnn*, Marianne Moore, Gregory Turner, Laura Grieneisen, Sarah Brownlee, Morgan Furze, Chelsey Musante, Megan Vodzak,** and **Kenneth Field**. Bucknell University, Lewisburg, PA.

ORAL SESSION I

SATURDAY, MARCH 31

9:00 – 10:30 AM

CANCER BIOLOGY I

SC 136

Angela Hess, Session Chair

9:00-9:15

11. *In vitro effects of low-dose ionizing radiation on primary skin cells.* **Ackerman, Andrew*, Kelly N. Barko, Naz Afarin Fallahian,** and **Angela R. Hess.** Bloomsburg University, Bloomsburg PA.

9:15-9:30

12. *Eph receptor and ephrin ligand expression in human keratinocytes, melanocytes and melanoma cell lines.* **Pierce, Diana H.*** and **Angela R. Hess.** Bloomsburg University Bloomsburg PA.

9:30-9:45

13. *The measure of damage associated molecular pattern molecules and their role in recruiting regulatory T cells.* **Kurt, Robert** and **Christine Vrakas*.** Lafayette College, Easton, PA.

9:45-10:00

14. *Mapping of the SV40 T antigen binding domain to TBP in vivo.* **Frantz, Brian***, **Matthew Rimbey***, and **Jane Cavender**. Elizabethtown College, Elizabethtown, PA.

10:00-10:15

15. *The effects of SV 40 large tumor antigen expression on 3T3-L1 pre-adipocyte cell differentiation.* **Godfrey, Jordon *, Kevin Bloh,** and **Jane F. Cavender**. Elizabethtown College, Elizabethtown, PA.

10:15-10:30

16. *Decrease in $CD8^+$ T cells following treatment of mice with exogenous corticosterone.* **Bahr, Elizabeth*** and **Jodi L. Yorty.** Elizabethtown College, Elizabethtown, PA.

ORAL SESSION II

SATURDAY, MARCH 31

9:00 – 10:30 AM

CELL & DEVELOPMENTAL BIOLOGY

OBC 1

Amy Reese, Session Chair

9:00-9:15

17. *SEM analysis of morphogenesis during anterior regeneration in a spionid polychaete Marenzelleria viridis.* **Whitford, Tracy*** and **Jason D. Williams**. Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA.

9:15-9:30

18. *Is FoxO expressed in interstitial stem cells in Hydra vulgaris*? **Gingrich, Stephanie*** and **Diane Bridge.** Elizabethtown College, Elizabethtown, PA.

9:30-9:45

19. *Analysis of the relationship between fetal microchimerism cells in the spleen and liver and the presence and severity of Idiopathic Thrombocytopenic Purpura.* **Varner, Chelsea*, Brad E. Engle, Catherine T. Santai,** and **Michael J. Doenhoff.** Department of Physical and Life Sciences, Wilson College, Chambersburg, PA.

9:45-10:00

20. *Phosphorylation Replication Protein a plays a role in telomere length maintenance in Saccharomyces cerevisiae.* **McQuilken, Molly*** and **André P. Walther**. Cedar Crest College, Allentown, PA.

10:00-10:15

21. *Elucidating the role of Atg5 and autophagy in clearance of Shigella flexneri from infected cells*. **Gau, Yael*, Winnie Okwaare*, Caleb Smith, Michael Myett, Alyssa C. Bumbaugh,** and **Lucinda H. El-**

liott. Shippensburg University, Shippensburg, PA.

10:15-10:30

22. *Determination of the natural expression of alpha-1,3-glucanase in Cryptococcus neoformans.* **Mascibroda, Laura*** and **Amy J. Reese.** Cedar Crest College, Allentown PA.

POSTER SESSION I

SATURDAY, MARCH 31

10:00 AM – 12:00 PM

CELL & DEVELOPMENTAL BIOLOGY

LEE'S GYM

Steven James, Session Chair

23. *Expansins in algal and basal land plant lineages.* **Hepler, Nathan K.*, Sarah A. Beatty,** and **Robert E. Carey.** Lebanon Valley College, Annville, PA.

24. *Analysis of the pectin methylesterase gene family in Phytophthora infestans*. **Mingora, Christina, Jason Ewer*, Chrispin Otondi,** and **Manuel Ospina-Giraldo.** Lafayette College, Easton, PA.

25. *Characterization of the chitin synthase gene in Phytophthora.* **Hinkel, Lauren*, Hannah Komar, Corey Shea,** and **Manuel Ospina-Giraldo.** Lafayette College, Easton, PA.

26. *Observing the expression of Chlamydomonas reinhardtii proteins when exposed to various concentrations of selenium.* **Rocco, Sarah*** and **Melinda Harrison** Cabrini College, Radnor, PA.

27. *The use of p-XSC as a chemopreventative agent in Saccharomyces cerevisiae.* **Resnick, Shoval*, André P. Walther,** and **Marianne Staretz.** Cedar Crest College, Allentown, PA.

28. *Cloning, expression and purification of two C-terminal fragments of Saccharomyces cerevisiae Srs2 helicase to study structural changes upon binding to Rad 51 protein.* **Shaley, Kiel*** and **Jana L. Villemain.** Indiana University of Pennsylvania, Indiana, PA.

29. *Replication Protein A phosphorylation regulates nucleotide excision repair and may regulate physical interactions with repair proteins in Saccharomyces cerevisiae.* **Cutaiar, Gabrielle*, Kirsten Nole,** and **André Walther**. Cedar Crest College, Allentown, PA.

30. *Phosphorylation of Replication Protein A plays a role in regulating checkpoint release in the presence of unrepairable DNA damage in Saccharomyces cerevisiae.* **Bender, Courtney*** and **André P. Walther**. Cedar Crest College, Allentown, PA.

31. *Coping with stalled replication forks: Investigating the roles of DNA repair genes and checkpoint regulators in the S phase DNA damage response.* **Marll, Michael*, Trevor Kerstetter,** and **Steven James**. Gettysburg College, Gettysburg, PA.

32. *Identification of phosphorylation dependent interactions between Replication Protein A and cellular proteins in the Saccharomyces cerevisiae.* **Mahoney, Chelsea*, Kayla Hager,** and **André Walther**. Cedar Crest College, Allentown, PA.

33. *Analysis of the Role of Replication Protein A Phosphorylation on Telomere Length in the budding yeast Saccharomyces cerevisiae.* **Pattison, Amanda*, Molly McQuilken,** and **André P. Walther**. Cedar Crest College, Allentown, PA.

34. *Assessing the role of Sum1 mutants in the meiotic development of S. cerevisiae.* **Williams, Byron*, Pooja Jaisinghani, Winifred Wolfe, Edward Winter,** and **Aikaterini Skokotas.** Rosemont College, Rosemont, PA.

35. *Assaying spore production in S. cerevisiae by varying optical density.* **Sheth, Kesha*, Aninash Gabbeta, Edward Winter,** and **Aikaterini Skokotas.** Rosemont College, Rosemont, PA.

36. *Analysis of meiotic commitment using a GFP-tagged protein in S. cerevisiae.* **Wolfe, Winifred*, Edward Winter,** and **Aikaterini Skokotas.** Rosemont College, Rosemont, PA.

37. *Let's break this down: Can alpha-1,3-glucanase be used to break the attachment of capsule from Cryptococcus neoformans?* **Korpics, Samantha*, Christina Morra,** and **Amy J. Reese.** Cedar Crest College, Allentown PA.

38. *Subdomain analysis of the BRDF checkpoint motif of the nimO^{Dbf4} regulator of DNA synthesis.* **Kerstetter, Trevor*** and **Steven James.** Gettysburg College, Gettysburg, PA.

39. *Characterizing Rhodotorula fungal strains by a genotypic approach.* **Akers, Natalie*** and **Amy J. Reese.** Cedar Crest College, Allentown PA.

40. *Genetic determinants of virulence in the fungal pathogen Cryptococcus neoformans.* **Ory, Jeramia, Kathryn Phillips*, Christina Marvin*, Richard Kliman,** and **Erin McClelland.** King's College, Wilke-Barre, PA.

41. *Role of iron and copper in Cryptococcal virulence.* **Ory, Jeramia, Chelsea Manes*, Harry Pockevich*,** and **Shannon Ellis.** King's College, Wilke-Barre, PA.

42. *Heat-induced oxidative stress in the earthworm Eisenia hortensis.* **Tumminello, Richard*** and **Sheryl L. Fuller-Espie.** Cabrini College, Radnor, PA.

43. *Effects of pathogen-associated molecular patterns on the prophenoloxidase pathway using Eisenia hortnesis.* **Brown, Janice*** and **Sheryl L. Fuller-Espie**. Cabrini College, Radnor, PA.

44. *Characterization of the transcriptional regulatory fat gene, klf-3 in Caenorhabditis elegans.* **Redding, Stephen, Jordan Krawitz, Sarwar Hashmi, Randy Gaugler,** and **Christopher W. Brey*.** Marywood University, Scranton PA.

45. *Swim motor systems in Goldfish (Carassius auratus).* **Clayman, Carly*** and **J. Sidie.** Ursinus College, Collegeville, PA.

46. *The cloning and expression of SNAP-25a and b in Zebrafish.* **Lavarias, Maia*** and **Wendy Boehmler.** York College of Pennsylvania, York, PA.

47. *Investigation of Syntaxin 3B in developing Zebrafish embryos.* **Anderson, Derek*** and **Wendy Boehmler.** York College of Pennsylvania, York, PA.

48. *The interferon response to Epstein-Barr Virus.* **Reenstra, Danielle*** and **David Singleton**. York College of Pennsylvania, York, PA.

49. *Developing an in vitro system for determining the biochemical mechanism of apoptosis regulation by human holocytochrome c synthetase.* **Fredericks, Lawrence*, Terry Weller*, Stephanie Hoppes*, William Blakely*, Matthew Junker,** and **Carsten Sanders.** Kutztown University, Kutztown, PA.

50. *Glutamate induced oxidative stress in SH-SY5Y cells: An in vitro model of Post-Traumatic Stress Disorder.* **Shook, Jake*, Carly Krisavage, Eric Leedock,** and **Barbara Fenner.** King's College, Wilkes-Barre, PA.

51. *Characterization of epidermal growth factor receptor gene in glioblastoma cells.* **Snyder, Nathan*** and **William J. Patrie**. Shippensburg University, Shippensburg, PA.

52. *Effects of estrogen and the BPA on cathepsin activity and its connection to the autoimmune disease systemic lupus erythematosus.* **Roberts, Rebecca** and **Samantha Simpson*.** Ursinus College, Collegeville, PA.

53. *Analysis of the binding of benzodiazepines to human serum albumin using rapid equilibrium dialysis.* **Polzella, Marie*** and **Marianne Staretz.** Cedar Crest College, Allentown, PA.

54. *Fluorescence analysis of the interactions of bilirubin, fatty acids and human serum albumin.* **Ballreich, Tatiana*** and **Marianne Staretz.** Cedar Crest College, Allentown, PA.

55. *Ginkgo biloba may play a role in reducing or preventing damage in a primary neuronal model of ischemia.* **Marietti, Marissa L.*, Diane I. Fitch*, Samantha Kitts*, Amanda E. Rocklyn*,** and **Audrey J. Ettinger.** Cedar Crest College, Allentown, PA.

56. *Stem cells in cichlid fish: Studying retinal progenitor cell differentiation and identifying stem cell niches in the brain of the model organism Rocio octofasciata.* **Kaur, Sandip*, Wajeeha R. Qureshi*,** and **Audrey J. Ettinger.** Cedar Crest College, Allentown, PA.

57. *The relationship of pre-natal diet to body weight and subcutaneous fat in adult offspring in CD-1 mice.* **Mast, Jesse*, Ronald Kaltreider,** and **Bradley Rehnberg.** York College of Pennsylvania, York, PA.

58. *Characterization of novel epidermal growth factor receptor target genes implicated in Drosophila egg and wing development.* **Hunter, Justin*, Jacquelyn Gallo*, Luke Dombert*, Nicholas Sweeney*, Erica Naperkowski,** and **Lisa Kadlec.** Wilkes University, Wilkes-Barre, PA.

59. *Expression of Matrix Metalloproteinases 14 and 24 during sea urchin development.* **Brigman, Floyd R.*** and **Eric P. Ingersoll.** Penn State Abington, Abington, PA.

60. *Expression of Aminopeptidase N genes during sea urchin development*. **Drab, Diana L.*** and **Eric P. Ingersoll.** Penn State Abington, Abington, PA.

61. *The effects of acetaminophen on chick development*

and the expression of glutathione-S-transferase gene. **Rhone, Abby N.***and **Cristen L. Rosch.** Kutztown University, Kutztown, PA.

62. *Teratogenicity and mutagenicity of the natural insecticide catnip oil.* **McCoy, Jazzmyn*** and **Cristen L. Rosch**. Kutztown University, Kutztown, PA.

ORAL SESSION III

SATURDAY, MARCH 31

10:45AM-12:00PM

AQUATIC ECOLOGY I

SC 136

Theo Light, Session Chair

10:45-11:00

63. *Brook Trout reproductive success and roadside-based passive treatment systems: crab shell chitin in the limelight.* **Gordon, Matthew[1*], Kenneth Anderson[2],** and **Andrew Turner[1]** [1]Clarion University, Clarion, PA; [2]Pennsylvania Fish and Boat Commission, Tionesta, PA.

11:00-11:15

64. *Fish exposure to emerging contaminants in municipal wastewater: can dietary sewage contribution predict severity of estrogenic effects?* **Kesslak, Lauren E.*, Tammy L. Smith,** and **Theo Light.** Shippensburg University, Shippensburg, PA

11:15-11:30

65. *Surface water quality monitoring to address the impacts on Marcellus Gas development on small and medium streams in northeast Pennsylvania.* **Barnard, T.*, E. Schramm, B. Naberezny, D. Bruns,** and **K. Klemow.** Institute for Energy and Environmental Research of Northeastern PA and Wilkes University, Wilkes-Barre, PA.

11:30-11:45

66. *The active ingredient in anti-depressants can influence levels of the fecal indicator bacteria E. coli in recreational freshwaters.* **Mulugeta, Surafel, Eric Clark*, Drew Spacht, Gillian Jones, Irfan Haider,** and **Steven Mauro.** Mercyhurst University, Erie, PA.

ORAL SESSION IV

SATURDAY, MARCH 31

10:45 AM – 12:00 PM

EDUCATION

SC 139

Kenneth Klemow, Session Chair

10:45-11:00

67. *Data exploration in the ecology classroom: The Science-Pipes approach.* **Allen, P., K.M. Klemow*, T. Mourad,** and **C. Smith.** Wilkes University, Wilkes-Barre, PA.

11:00-11:15

68. *BioLEAD: An opportunity for collaboration in molecular genetics, neuroscience, and developmental biology laboratories.* **Karnas*, K. Joy** and **Audrey J. Ettinger*,** Cedar Crest College, Allentown, PA.

11:15-11:30

69. *Bio2010 meets Vision and Change in Undergraduate Biology Education: The HHMI SEA national genomics research initiative.* **Harrison, Melinda** and **David Dunbar*.** Cabrini College, Radnor, PA.

11:30-11:45

70. *Responding to Climate Change: a project-centered course to advance climate action planning in the university.* **Prischak, Brittany*** and **J. Michael Campbell.** Mercyhurst University, Erie, PA.

11:45-12:00

71. *Achieving an accurate public understanding of Marcellus shale gas impacts: opportunities for scientists and educators.* **Klemow, Kenneth M*.** Wilkes University, Wilkes-Barre, PA.

ORAL SESSION V

SATURDAY, MARCH 31

10:45AM-12:00PM

ANIMAL PHYSIOLOGY

OBC 1

Darlene Melchitzky, Session Chair

10:45-11:00

72. *Hypothalamic innervation of the mediodorsal thalamus in macaque monkey: Location of projection neurons.* **Russell, Ashley L.*** and **Darlene S. Melchitzky.** Mercyhurst University, Erie, PA

11:00-11:15

73. *Social reorganization in female mice and its impact on hippocampal function.* **Fedorczyk, Lori, Brad E. Engle, M. Dana Harriger,** and **Carl F. Larson**. Wilson College, Chambersburg, PA.

11:15-11:30

74. *Effect of high folic acid serum concentration through diet fortification and supplementation on the development of rats*. **Doscher, Briana*, M. Dana Harriger, Brad E. Engle,** and **Catherine T. Santai.** Wilson College, Chambersburg, PA.

11:30-11:45

75. *A measure of electrolyte containing sports drinks: Effects on physiological parameters before, during, and after exercise.* **Beck, Laura M.*, Brad E. Engle,** and **M. Dana Harriger.** Wilson College, Chambersburg, PA.

POSTER SESSION II

SATURDAY, MARCH 31

2:30 - 4:30 PM

EXPLORATIONS IN SCIENCE

LEE'S GYM

Courtney Lappas, Session Chair

76. *Preliminary studies of the effect of blood alcohol concentration on the calculation of the impact angle in bloodstain pattern analysis.* **Delle Donne, Nicole*** and **Thomas A. Brettell.** Cedar Crest College, Allentown, PA.

77. *Dispersion staining and the Christiansen Effect as a means of detecting heat-induced changes in glass refractive index.* **Phillips, Erin*** and **Jacqueline A. Speir.** Cedar Crest College, Allentown, PA.

78. *Examination of the change in fluorescence of semen stains with time.* **Pacheco, Brianna*** and **Marianne Staretz.** Cedar Crest College, Allentown, PA.

79. *Learning on the Mountain: Hawk Mountain conservation activities, opportunities, and internships.* **Goodrich, Laurie*, Jeremy Scheivert,** and **Denise Peters.** Hawk Mountain Sanctuary Association, Kempton, PA.

80. *Educating the public about Marcellus Shale: an informational website for Northeastern Pennsylvania.* **Hines, D.*, E. Schramm, C. Sperger,** and **K. Klemow.** Wilkes University, Wilkes-Barre, PA.

81. *Bridge classroom project to real world technology applications: Reverse engineering personal transportation.* **Brophy, Shane*, Nick Triano, Chris Kotansky,** and **Harsh Patel.** Penn State University, Hazleton, PA.

82. *Isolation of plant growth promoting bacteria to teach basic microbiological concepts and techniques; an alternative environmental unknown project.* **Keler, Cynthia*.** Delaware Valley College, Doylestown, PA.

83. *Prevalence of Staphylococcus aureus on the door handles of assisted living versus independent living resident's rooms in a retirement facility.* **Blanschan, Joseph S.*** and **Carolyn F. Mathur**, York College of Pennsylvania, York, PA.

84. *The nasal carriage rate of Staphylococcus aureus among college students: 2007-2011.* **Cusick, Corinne E.*** and **Carolyn F. Mathur.** York College of Pennsylvania, York, PA.

85. *Surveillance of KPC carbapenemase-producing Klebsiella pneumoniae, Northeastern Pennsylvania.* **Stanton, Brielle*, Kasia Szulborski, Lorinette Williams,** and **Kenneth Pidcock.** Wilkes University, Wilkes-Barre, PA.

86. *Interaction of cell and capsule in Rhodotorula fungal species.* **Gray, Alicia*, Lauren McKean*,** and **Amy J. Reese.** Cedar Crest College, Allentown PA.

87. *The impact of the microcosm on the survivability of Shiga toxin producing E. coli (STEC) in recreational freshwater.* **Opalko, Hannah*, Drew Spacht, Eric Clark, Kyle Lindsay,** and **Steven Mauro.** Mercyhurst University, Erie, PA.

88. *The effect of plant growth promoting bacteria on lettuce grown in varying salt concentrations.* **Dickinson, Courtney*** and **Cynthia Keler.** Delaware Valley College, Doylestown, PA.

89. *Identification of ammonia-oxidizing bacteria in soils overlying the coalmine fire in Centralia, Pennsylvania.* **Rittle, Rebecca*** and **Tammy Tobin.** Susquehanna University, Selinsgrove, PA.

90. *Presence of sulfur oxidizing and sulfate reducing bacteria at the site of the Centralia mine fire.* **Mauser, Holly*** and **Tammy Tobin.** Susquehanna University, Selinsgrove, PA.

91. *Soil microbial diversity in conventionally fertilized farm land and the effect of organic amendments on microbial diversity and crop yield.* **Miozzi, Nicole*, Maria Antunez,** and **Marlene Cross.** Mercyhurst University, Erie, PA.

92. *The effects of fertilization methods on mycorrhizal fungi and rhizobial bacteria in soil previously used for conventional farming.* **Sullivan, Hillary*, Siobhan Hacker,** and **Marlene Cross.** Mercyhurst University, Erie, PA.

93. *Gene sequencing of conch to test for possible hybridization between Strombus gigas and S. costatus.* **Schwab, Jennifer L.*, John A. Cigliano,** and **Richard M. Kliman.** Cedar Crest College, Allentown, PA.

94. *An evaluation of the genetic diversity of the Bobcats (Lynx rufus) of Pennsylvania, New Jersey, and Wisconsin.* **Rounsville Jr., Thomas F.*** and **Jane Huffman.** East Stroudsburg University, East Stroudsburg, PA.

95. *Identifying genomic signatures of local selection in global populations of Drosophila melanogaster.* **Stanley Jr., Craig E.*, Joseph R. Boland, Matthew E. B. Hansen,** and **Rob J. Kulathinal.** Temple University, Philadelphia, PA.

96. *Terpene synthase gene family in Medicago truncatula* and *Arabidopsis thaliana: Genome-wide identification, organization, expression and phylogenetics.* **Parker, Michael*, Yuan Zhong*, Xinbin Dai, Patrick Zhao,** and **Shiliang Wang**. Millersville University, Millersville, PA.

97. *Comparative genomic and phylogenetic analysis of short-chain prenyltransferases, triterpene synthases and terpene synthases in Arabidopsis: Do they share a common origin with Cyanobacteria homologues?* **Zhong, Yuan*, Jonny Kettering*, Michael Parker,** and **Shiliang Wang**. Millersville University, Millersville, PA.

98. *Using comparative genomics to identify compensatory mutations in human disease-related proteins.* **Curtin, Alexander P.*** and **Rob J. Kulathinal**. Temple University, Philadelphia, PA.

99. *ZnS nanocrystal cytotoxicity is influenced by capping agent chemical structure and duration of time in suspension.* **Black, Sarah E.*, Justin N. Weilnau, Michael P. Schmidt, Kimberly L. Holt, Lindsay M. Carl, Collin J. Straka, Walter A. Patton, Anderson L. Marsh,** and **Courtney M. Lappas.** Lebanon Valley College, Annville, PA.

100. *Immunological detection methods for the artificial sweetener sucralose in the environment.* **Diegelman-Parente, Amy** and **Nicole E. Frederickson*.** Mercyhurst College, Mercyhurst, PA.

101. *Chemical Detection Methods for the Artificial Sweetener Sucralose in the Environment.* **Diegelman-Parente, Amy** and **Ashley E. Westgate*.** Mercyhurst College, Mercyhurst, PA.

102. *Design of a biological sensor for ATP using a DNA aptamer and calorimetry.* **Diegelman-Parente, Amy** and **Gregg Robbins-Welty*.** Mercyhurst College, Mercyhurst, PA.

103. *Examination of fluoride levels in beverages commonly consumed by children.* **Rittenhouse, Jennifer*** and **Marianne Staretz.** Cedar Crest College, Allentown, PA.

104. *Control of gestational diabetes via the use of insulin eye drops: A mouse model.* **Bacigalupo, Jorge A.*** and **Carl R. Pratt.** Immaculata University, Immaculata, PA.

105. *The effect of zinc sulfide nanopartiles on Spirodela polyrhiza.* **Kulp, Alyssa*, Amanda Jenkins, Lindsay M. Carl, Collin J. Straka, Anderson L. Marsh,** and **Rebecca A. Urban.** Lebanon Valley College, Annville, PA.

106. *A study of the megasporogenesis and megagametogenesis of Cardamine parviflora L.* **Smith, Bruce** and **Rob Harvey*.** York College of Pennsylvania, York, PA.

107. *Comparison of fungal endophyte detection methods in seeds and infection frequencies in conservation seeds*. **Maresca, Gregory*** and **Tammy Tintjer**. King's College, Wilkes-Barre, PA.

108. *The effect of lower pH in Turkey Extender buffer solution used in turkey artificial insemination on male to female poultry ratio.* **Robinson, Ellen*** and **Fredrick R. Hofsaess**, Delaware Valley College, Doylestown, PA.

109. *Medullary variation in tail hairs in the family Sciuridae.* **Bove, Daniel*** and **Howard P. Whidden**. East Stroudsburg University, East Stroudsburg, PA.

110. *Ingestion of sand and its impact on dual-energy X-ray absorptiometry estimates of body composition in turtles.* **Turner, Alec J.*** and **Matthew D. Stone.** Kutztown University, Kutztown, PA.

111. *A new apparatus for measuring plastral adduction forces in the Eastern Box Turtle (Terrapene c. carolina L.).* **Delis, Alexander*, Brad Armen,** and **Pablo R. Delis.** Shippensburg University, Shippensburg, PA.

112. *Morphology, bite-force, and bill closing velocity in North American birds.* **Lowenberger, Lauren K.*, Brandan L. Gray,** and **Clay E. Corbin.** Bloomsburg University of Pennsylvania, Bloomsburg, PA.

113. *Investigating the effects of social behavior on somatostatin and gonadotropin releasing hormone neurons in the Cichlid fish brain.* **Oswald, Kaitlin A.*, Kristen A. Sigley*,** and **Audrey J. Ettinger.** Cedar Crest College; Allentown, PA.

114. *Behavioral responses of mice to olfactory cues from natural oils.* **Thomas, Jennifer** * and **Bradley Rehnberg.** York College of Pennsylvania, York, PA.

115. *The effects of sleep deprivation on sympathetic nervous system output during induced mental stress.* **Enterline, Rebecca *, Brianna Lutz*,** and **David Broussard.** Lycoming College, Williamsport, PA.

ORAL SESSION VI

SATURDAY, MARCH 31

2:45-4:00PM

ALGAL BIOLOGY

MILLER 33

J. Michael Campbell, Session Chair

2:45-3:00

116. *Method for taxon-specific measurement of algal lipids and biofilm development.* **Campbell, J. Michael** and **Thomas Croushore-Kysor.** Mercyhurst University, Erie, PA.

3:00-3:15

117. *Laboratory simulated seasonal changes of lipid and biofilm production in Melosira from Lake Erie.* **Teygart, Ellen L.*** and **J. Michael Campbell.** Mercyhurst College, Erie, PA.

3:15-3:30

118. *Occurrence of lipids and biofilms in nearshore Lake Erie cyanobacteria and diatoms during the fall turnover.* **Vojtek, Christina M.***and **J. Michael Campbell.** Mercyhurst University, Erie, PA.

3:30-3:45

119. *Characterization of algae bio-oil produced by microwave-assisted pyrolysis: A study of the potential for algae bio-oil as an alternative fuel source.* **Bender, Tonya J.*, Catherine T. Santai,** and **Deborah S. Austin**. Wilson College, Chambersburg, PA.

ORAL SESSION VII

SATURDAY, MARCH 31

2:45-4:00PM

ANIMAL ECOLOGY

SC 136

Gregory George, Session Chair

2:45-3:00

120. *Home range size and habitat use of Andean bears (Tremarctos ornatus) in the Intag Region of Northern*

Ecuador. **Wetzel, Ashley*, Laura F. Altfeld, Deborah S. Austin,** and **Celeste Barthel.** Wilson College, Chambersburg, PA.

3:00-3:15

121. *The Louisiana Waterthrush as a bioindicator of hemlock habitat productivity: A comparison of hemlock ravines and benches.* **Ernst, Nicholas*** and **Terry Master.** East Stroudsburg University, East Stroudsburg, PA.

3:15-3:30

122. *Habitat preference of the Hooded Warbler (Wilsonia citrina) within Delaware Water Gap National Recreation Area.* **Vranicar Kutch, Jennifer*** and **Terry Master.** East Stroudsburg University, East Stroudsburg, PA.

3:30-3:45

123. *Prey selection of wintering Long-Earred Owls (Asio otus).* **George, Gregory A., Melissa Gallo*,** and **Katie Rittenhouse**. Delaware Valley College, Doylestown, PA.

3:45-4:00

124. *Morphometrics and ecology of the American Toad (Anaxyrus americanus) at Letterkenny Army Depot, South Central Pennsylvania*. **Humbert, William S.[1]*, Pablo R. Delis[1],** and **Walter E. Meshaka, Jr.[2].** [1]Shippensburg University, Shippensburg PA; [2]State Museum of Pennsylvania, Harrisburg PA.

ORAL SESSION VIII

SATURDAY, MARCH 31

2:45-4:00PM

GENETICS

OBC 1

Carol Hepfer, Session Chair

2:45-3:00

125. *Comparison of mitochondrial D-Loop sequences in Brook Trout (Salvelinus fontinalis) collected from isolated populations.* **Kunster, Olivia*, Sarah R. Crane, Nicholas J. Petersen, Fred J. Brenner[1],** and **Shawn Rummel[2].** [1]Grove City College, Grove City, PA; [2]Trout Unlimited.

3:00-3:15

126. *Identification and relatedness of Katmai brown bears.* **Turner*, Sara.** Mercyhurst University, Erie, PA.

3:15-3:30

127. *Genomic signatures of sexual selection.* **Boland, Joseph R. *, Matthew E. B. Hansen, Craig E. Stanley, Jr.,** and **Rob J. Kulathinal.** Temple University, Philadelphia, PA.

3:30-3:45

128. *Identification of sex-specific genetic sequences in the squid Doryteuthis pealeii.* **Behmer, Philomena***, **Danielle Farnell,** and **Carol Ely Hepfer**. Millersville University, Millersville, PA.

3:45-4:00

129. *Genome sequencing of Lycomia zaccaria gen. nov sp nov., Chryseobacterium haifense, and Kaistella koreensis and comparison to two closely related genomes.* **Krebs*, Jordan, Tom Sontag,** and **Jeffrey Newman.** Lycoming College, Williamsport, PA.

ORAL SESSION IX

SUNDAY, APRIL 1

9:00-10:30AM

PLANT INTERACTIONS

MILLER 33

Heather Sahli, Session Chair

9:00-9:15

130. *Environmental heavy metal detection using the molecular responses of flora and fauna.* **Ramdaney, Aarti*** and **K. Joy Karnas**. Cedar Crest College, Allentown, PA.

9:15-9:30

131. *Analysis of the microbial composition within the rhizosphere of the Common Reed (Phragmites australis) at varying stages of invasion*. **Schaller, Victoria***, **M. Kitchens-Kintz.**, East Stroudsburg University, East Stroudsburg, PA.

9:30-9:45

132. *Efficacy of Galerucella calmariensis and G. pusilla as biocontrol agents of Lythrum salicaria at Jacobsburg State Park.* **Foye, Shane*** and **Megan Rothenberger**. Lafayette College, Easton, PA.

9:45-10:00

133. *Effects of logging on plant reproduction and pollinator communities in south central Pennsylvania.* **Sahli, Heather F.*, Alicia Helfrick, Nathan Weber,** and **Jaclyn Braund**. Shippensburg University, Shippensburg, PA.

10:00-10:15

134. *Quantifying the efficacy of native bees for orchard pollination in Pennsylvania to offset the increased cost and decreased reliability of Honeybees.* **Ritz, Amanda* Heather Sahli, David Biddinger, James Schupp, Edwin Winzler, Ed Rajotte,** and **Neelendra Joshi.** Shippensburg University, Shippensburg, PA; Penn State Fruit Research and Extension Center, Biglerville, PA; Penn State University, State College, PA.

10:15-10:30

135. *Analysis of local honey: Foraging diversity and colony fitness in Philadelphia Honeybees (Apis mellifera L.).* **Nicholson, Charles C.*** Morris Arboretum of the University of Pennsylvania, Philadelphia, PA.

ORAL SESSION X

SUNDAY, APRIL 1

9:00-10:30AM

GIS/OCEAN SYSTEMS

SC 136

James Hunt, Session Chair

9:00-9:15

136. *Generation of high resolution digital terrain models from NASA's Atmospheric Terrain Mapper (ATM) Light Detection and Ranging (LiDAR) System.* **Campion, Scott*, Shixiong, Hu,** and **Michael Prestoy**. East Stroudsburg University, East Stroudsburg, PA.

9:15-9:30

137. *GIS-Based study on the distribution of water temperature in local stream.* **Zhang, Shuhan*, Shixiong Hu,** and **Scott Collenburg.** East Stroudsburg University, East Stroudsburg, PA.

9:30-9:45

138. *Delaware's vanishing North Atlantic High Salt Marsh: Where is it going and how much?* **Coxe, Robert*.** Delaware Division of Fish and Wildlife, Natural Heritage and Endangered Species Program, Smyrna, DE.

9:45-10:00

139. *Using Niche Modeling to predict possible geographic range shifts in Strombus gigas (Queen Conch) under various climate change scenarios.* **Welch, Kara*** and **John A. Cigliano.** Cedar Crest College, Allentown, PA.

10:00-10:15

140. *Comparison of the health and diversity of coral reefs in areas of the Caribbean Sea and Indian Ocean.* **Stella, Angelina*** and **James C. Hunt.** East Stroudsburg University, East Stroudsburg, PA.

10:15-10:30

141. *An analysis of the effectiveness of a shark "blocker" device to prevent gut-hooking in recreational shark fishing.* **Shahalemi, Raushan R.*** and **James C. Hunt**. East Stroudsburg University, East Stroudsburg, PA.

ORAL SESSION XI

SUNDAY, APRIL 1

9:00-10:30AM

PARASITOLOGY

OBC 1

M. Dana Harriger, Session Chair

9:00-9:15

142. *Miracidial infection of Echinostoma caproni in neonatal and adult Biomphalaria glabrata snails.* **Balaban, Amanda*** and **Bernard Fried.** Lafayette College, Easton, PA.

9:15-9:30

143. *Effects of 17α-ethinyl estradiol on hard clam (Mercenaria mercenaria) immunity and QPX (Quahog Parasite Unknown) infection.* **Rhodes, Ciera[1*], Bassem Allam[2], Laura F. Altfeld[1],** and **Brad E. Engle[1].** [1]Wilson College, Chambersburg, PA; [2] Stony Brook University, Stony Brook, NY.

9:30-9:45

144. *Antimicrobial effects of essential oils for the control of oral bacteria in the prevention of periodontal disease in canines.* **Bernard, Alyssa J.*, Brad G. Stiles,** and **M. Dana Harriger.** Wilson College, Chambersburg, PA.

9:45-10:00

145. *Enumeration and antibiotic resistance patterns of Escherichia coli isolated from Mute Swans (Cygnus olor).* **Huffman, Jane** and **Jamie Brobst***. East Stroudsburg University, East Stroudsburg, PA.

10:00-10:15

146. *The occurrence of tick-borne pathogens in Black Bears (Ursus americanus) in New Jersey.* **Bove, Daniel J**.*, **Melissa Shaw,** and **Jane E. Huffman**. East Stroudsburg University, East Stroudsburg, PA.

10:15-10:30

147. *Molecular characterization of Babesia spp. in Black Bears (Ursus americanus) in New Jersey.* **Shaw, Melissa*** and **Jane E. Huffman**. East Stroudsburg University, East Stroudsburg, PA.

POSTER SESSION III

SUNDAY, APRIL 1

10:00 AM– 12:00 PM

GIS, ECOLOGY, AND ENVIRONMENTAL BIOLOGY

LEE'S GYM

Pablo Delis, Session Chair

148. *Measuring bathymetry and sediment deposition in Walker Lake, PA with use of ground penetration radar.* **Booterbaugh, Aaron*** and **Ahmed Lachhab.** Susquehanna University, Selinsgrove, PA.

149. *Tracking ground water level using seismic refraction, GPR, water level transducer and a laboratory model.* **Quinlan, Ian*** and **Ahmed Lachhab**. Susquehanna University, Selinsgrove, PA.

150. *Evaluation of impact of precipitation and land-use change on stream flow in Monocacy Creek, using hydrological modeling.* **Lan Junxing*** and **Candie Wilderman,** Dickinson College, Carlisle, PA.

151. *Riparian buffer impacts and stream temperature changes in a first order Pennsylvania stream.* **Niles, Christopher*** and **Thomas Murray**. Elizabethtown College, Elizabethtown, PA.

152. *Baseline water quality data collection of selected streams in the City of Altoona.* **Wilmont, Ashley*, Travis Marks*,** and **Carolyn Mahan**. Penn State Altoona, Altoona, PA.

153. *Assessing surface water removal impacts on Bowmans Creek in Wyoming County, Pennsylvania.* **Sulzer, Nicholas*, Lawrence Paddock*, Jonathan Weiss,** and **Barbara McCraith.** Misericordia University, Dallas, PA.

154. *Analysis of disinfection methods to prevent cross-contamination of avian populations during collection of bite-force.* **Cameron, Ashley K.*, Clay E. Corbin, and Karl W. Henry.** Bloomsburg University, Bloomsburg, PA.

155. *Environmental factors that affect regeneration in Planaria.* **Van Sicklin, Lauren*** and **Christopher Tipping.** Delaware College, Dolyestown, PA.

156. *Protease inhibitors reduce degradation of the cellular stress marker HSP70 in Lumbriculus variegates.* **Thompson, Cassaundra*, Heather Ressler*, Cynthia Surmacz,** and **John M. Hranitz.** Bloomsburg University, Bloomsburg, PA.

157. *The effect of light intensity on the geotactic behavioral response of the New Zealand mud snail (Potamopyrgus antipodarum).* **Aponte, Sabrina*, Allysa Byrd, Elissa Colledge, Brittany Smith, Frank Manaquale, Sarah Landis,** and **Edward P. Levri.** Penn State Altoona, Altoona, PA.

158. *The invasive New Zealand mud snail (Potamopyrgus antipodarum) expands its range in streams in the Laurentian Great Lakes watershed.* **Colledge, Elissa*, Brittany Smith, Rachel Bilka,** and **Edward P. Levri.** Penn State Altoona, Altoona, PA.

159. *Diet and behavior of Appalachian brook crayfish in acidic and neutral pH mountain streams.* **Richardson, Hannah*[1] Alicia Helfrick[2],** and **Theo Light[2].** [1]Shippensburg Area High School, [2]Shippensburg University, Shippensburg, PA.

160. *Effects of fish on the feeding habits of salamanders in streams.* **Stavish, Gary*** and **Garrett Barr.** King's College, Wilkes-Barre, PA.

161. *Anti-predator behavior exhibited by stream macroinvertebrates when exposed to multiple predators.* **Bauza, Jacqueline*, Brittany Sohle,** and **Garrett Barr.** King's College, Wilkes-Barre, PA.

162. *An application of the Optimal Defense Theory: Analyzing the defenses of a marine sponge, Axinella polycapella, against predatory reef fish.* **Beidel, Emilee*, Laura F. Altfel,** and **Deborah S. Austin**. Wilson College, Chambersburg, PA.

163. *The effect of multiple stressors, increased temperature and acidification on the growth and survival of the Common Periwinkle, Littorina littorea*. **Funk, Amber*** and **John A. Cigliano.** Cedar Crest College**,** Allentown, PA.

164. *Optimizing the diet of the Cortez Round Ray, Urobatis maculatus, at That Fish Place for Healthier Living*. **Horn, Theresa*** and **Jessica Nolan**. York College of Pennsylvania, York, PA.

165. *Stimulation of settlement and metamorphosis of larvae of Capitella teleta by marine algae and bacteria.* **Scavo, Gia*, Christopher Lehman, Kenneth Pidcock,** and **William J. Biggers.** Wilkes University, Wilkes-Barre, PA .

166. *Detection of Dirofilaria immitis (Nematoda: Filarioidea) by Polymerase Chain Reaction in the Asian Tiger Mosquito* (ATM), *Aedes albopictus, from northern New Jersey.* **Rivera, Natasha [1*], Sunshine Overturf[1*], Ary Farajollahi[2], Randy Gaugler[2],** and **Christopher W. Brey[1].** [1]Marywood University**,** Scranton PA; [2]Rutgers University, New Brunswick NJ.

167. *Seasonal development of cold tolerance and overwintering physiology of the goldenrod gall fly, Eurosta solidaginis.* **Legters, Courtney*, Ashley Church*, Larae Tymochko,** and **Michael A. Elnitsky.** Mercyhurst University, Erie, PA.

168. *Sublethal injury and oxidative stress during freezing and thawing in the freeze-tolerant woolly bear caterpillar, Pyrrharctia isabella.* **Tymochko, Larae*, Jacklyn Papa,** and **Michael A. Elnitsky.** Mercyhurst University, Erie, PA.

169. *Painted lady butterfly (Vanessa cardui) preferences for amino acids in solution.* **Martin, Elliot*** and **Bradley Rehnberg.** York College of Pennsylvania, York, PA.

170. *The effect of diet on the survival and reproduction of the Brown Marmorated Stinkbug, Halyomorpha halys*. **Dechene, Robyn *** and **John A. Cigliano.** Cedar Crest College, Allentown, PA.

171. *Foraging preferences of Castor canadensis in a Leatherleaf-sedge wetland habitat.* **Barna, Laura*** and **Tammy Tintjer.** King's College, Wilkes-Barre, PA.

172. *Do Northern Saw-whet Owls (Aegolius acadicus) maintain kin associations during fall migration?* **Stromko, Caitlyn*** and **Karl Kleiner.** York College of Pennsylvania, York, PA.

173. *Comparison of reproductive characteristics between two mole salamanders from South Central Pennsylvania: implications for conservation*. **Bartle, Sarah*, Walter E. Meshaka,** and **Pablo R. Delis**. Shippensburg University, Shippensburg, PA.

174. *Geographic variation in morphometrics and life history traits in Spring Peeper (Pseudacris crucifer) populations in South Central Pennsylvania.* **Campbell, Laurel***, **Pablo R. Delis,** and **Walter Meshaka.** Shippensburg University, Shippensburg, PA.

175. *A riverfront population of the Eastern Garter Snake, Thamnophis s. sirtalis, in South-Central Pennsylvania.* **Anderson James*, Walter E. Meshaka,** and **Pablo R. Delis**. Shippensburg University, Shippensburg, PA.

176. *Distribution and population size of aquatic, Basking Turtles in Lake Marburg (Hanover, PA)*. **Haneschlager, Lisa***and **Jessica Nolan**. York College of Pennsylvania. York, PA.

177. *A study of the movements of Red-Bellied Turtles, Pseudemys rubriventris, and Red-Eared Sliders, Trachemys scripta elegans, in Lake Marburg, York County, PA.* **Axe, Joshua*** and **Jessica Nolan**. York College of Pennsylvania, York, PA.

178. *The importance of vision and olfaction in Trache-*

mys scripta elegans during prey capture. **Hoffman, Amanda*** and **Nolan, Jessica.** York College of Pennsylvania, York, PA.

179. *Seed dispersal by the Eastern Box Turtle (Terrapene carolina carolina) in South Central Pennsylvania.* **Simons, Pamela D.*, Danielle Hunsinger, Pablo R. Delis,** and **Heather F. Sahli.** Shippensburg University, Shippensburg, PA.

180. *Comparison of insect capture rates in two species of Pitcher Plant (Sarracenia)*. **Ferry, Samantha*, Ana Lemus-Moreno*, Brittany Ray*,** and **Erin Wysolmerski.*** Immaculata University, Immaculata, PA.

181. *Seed germination rate is not influenced by inflorescence number or size in mountain laurel (Kalmia latifolia).* **Manaquale, Frank M.*, Patrick Naughten, Maureen A. Levri,** and **Edward P. Levri.** Penn State-Altoona, Altoona, PA.

182. *The influence of inflorescence size and number on pollinator visitation and fruit set in mountain laurel (Kalmia latifolia).* **Naughten, Patrick*, Maureen A. Levri,** and **Edward P. Levri.** Penn State-Altoona, Altoona, PA.

183. *The influence of serpentine soil chemistry on plant morphology and plant-animal interactions: an experimental test of the common monkey-flower, Mimulus guttatus*. **Meindl, George A.*** and **Tia-Lynn Ashman**. University of Pittsburgh, Pittsburgh, PA.

184. *Local adaptation on California Serpentine sites: Assessing the effects of evolutionary history on Serpentine plant species.* **DeHart, Kyle*, George Meindl, Dan Bain,** and **Tia-Lynn Ashman.** University of Pittsburgh, Pittsburgh PA.

185. *Inhibition of woody colonization on a reclaimed anthracite mine: Role of seed germination and seedling survival.* **Hanna, Gousfin.*, Christa Filipkowski*, Amy Wascavage*,** and **Kenneth M. Klemow.** Wilkes University, Wilkes-Barre, PA.

186. *Temperature effects on pollen tube growth in flowers of Christmas cactus (Schlumbergera sp.).* **Faivre, Amy E., Stephanie H. Augustine*, Courtney B. Godbolt*,** and **Mehveen R. Qureshi*.** Cedar Crest College, Allentown, PA.

187. *Effect of pH on growth of the aquatic plant Duckweed (Lemna spp.)*. **Barnhart, Aaron, Lee Blair, Jennifer Kates, Jennifer Paull, Jessica Pavlikowski, Andrew Roccograndi, Gregory Sofia,** and **Cosima Wiese***. Misericordia University, Dallas, PA.

ORAL SESSION XII

SUNDAY, APRIL 1

10:45 AM – 12:00 PM

PHAGE BIOLOGY

SC 139

Alan Hale, Session Chair

10:45-11:00

188. *Mycobacteriophage Marvin: A new singleton phage with an unusual genome organization.* **Moran, Deborah*, Trevor Cross, Melinda Harrison,** and **David Dunbar.** Cabrini College, Radnor, PA.

11:00-11:15

189. *A genomic and proteomic analysis of Myoviradae mycobacteriophages.* **Cross, Trevor*, Deborah Moran, Melinda Harrison,** and **David Dunbar.** Cabrini College, Radnor, PA.

11:15-11:30

190. *Free phage and infected hosts: The relationship between time and adsorption.* **Huey, Samantha L.*** and **Alan B. Hale.** Cedar Crest College, Allentown, PA.

11:30-11:45

191. *Phage burst size: Eliminating error and false assumptions.* **Ronca, Shannon E.*** and **Alan B. Hale.** Cedar Crest College, Allentown, PA.

ORAL SESSION XIII

SUNDAY, APRIL 1

10:45AM-12:00PM

AQUATIC ECOLOGY II

MILLER 33

Amy Diegelman-Parente, Session Chair

10:45-11:00

192. *Restoration of Tom's Run from Acid Mine Drain-*

age: A 44-year study of perturbation and recovery. **Williams, Kirsten M.*** and **Andrew M. Turner**. Clarion University of Pennsylvania, Clarion, PA.

11:00-11:15

193. *Plankton dynamics and eutrophication in Raritan Bay: linkages between harmful algal bloom (HAB) species and long-term nutrient enrichment.* **Cabrey, Carolyn*** and **Megan Rothenberger.** Lafayette College, Easton, PA.

11:15-11:30

194. *The contribution of bacterial pollution by algal mats in recreational freshwater.* **Spacht, Drew*, Prabhat Kc, Irfan Haider,** and **Steven Mauro.** Mercyhurst University, Erie, PA.

11:30-11:45

195. *Environmental forensic investigation of source of organic contaminants in stream water and sediments.* **Pham, Melinda*** and **Frank Dorman**. Pennsylvania State University, University Park, PA.

11:45-12:00

196. *An elusive quest for food additives in the environment.* **Diegelman-Parente, Amy*.** Mercyhurst College, Mercyhurst, PA.

ORAL SESSION XIV

SUNDAY, APRIL 1

10:45 AM – 12:00 PM

CANCER BIOLOGY II

SC 136

Lawrence Mylin, Session Chair

10:45-11:00

197. *Examination of the role of Replication Protein A phosphorylation in the cellular response to ultraviolet-induced DNA damage.* **Nole, Kirsten*** and **André Walther**. Cedar Crest College, Allentown, PA.

11:00-11:15

198. *Generation of a Simian Virus 40 Large Tumor Antigen (SV40 T ag) 529-543-specific T cell receptor transgenic mouse.* **Hayes, Lindsey*, Daniel Kreider,** and **Lawrence Mylin.** Messiah College, Grantham, PA.

11:15-11:30

199. *Comparing the immunological potencies of two viral epitopes: LT529-543 from the Simian Virus 40 Large Tumor Antigen (SV40 T ag) vs. a related epitope from the Large Tumor Antigen of murine Polyomavirus.* **Miller, Elizabeth*, Benjamin Hallowell,** and **Lawrence Mylin.** Messiah College, Grantham, PA.

11:30-11:45

200. *CD4+ T lymphocyte induction by a mouse Polyomavirus epitope inserted into the Simian Virus 40 Large Tumor Antigen (SV40 T ag).* **Hallowell, Benjamin*, Elizabeth Miller,** and **Lawrence Mylin.** Messiah College, Grantham, PA.

11:45-12:00

201. *Comparison of 4T1 tumors in BALB/c mice injected orthotopically and subcutaneously.* **Kurt, Robert** and **Alicia Bartley*.** Lafayette College, Easton, PA.

ORAL SESSION XV

SUNDAY, APRIL 1

10:45 AM – 12:00 PM

FORENSICS

OBC 1

Jane Huffman, Session Chair

10:45-11:00

202. *Wildlife forensics.* **Jane Huffman*.** East Stroudsburg University, East Stroudsburg, PA.

11:00-11:15

203. *Analyzing the halo effect: Factors involved in sequencing the deposition of overlapping bloodstains caused by transfer and airborne droplets.* **Corby, Christen*** and **Quarino, Lawrence.** Cedar Crest College, Allentown, PA.

11:15-11:30

204. *Chromatographic analysis of synthetic amphetamine street samples.* **Leffler, Amanda*, Frank L.**

Dorman, and **Adriana De Armas.** The Pennsylvania State University, University Park, PA.

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Abstracts of Papers

88th Annual Meeting

of the Pennsylvania Academy of Science

March 30 - April1, 2012

Cedar Crest College

Allentown, PA

(Arranged in alphabetical order of first authors or presenters)

Ackerman, Andrew*, Kelly N. Barko, Naz Afarin Fallahian, and **Angela R. Hess.** Bloomsburg University, Bloomsburg PA. *In vitro Effects of Low-dose Ionizing Radiation on Primary Skin Cells*--This study was conducted to better understand how a low dose of ionizing radiation affects cell survival during continuous, prolonged exposure. Human keratinocytes and melanocytes were exposed to a Cadmium-109 source at 4, 8, 24, and 48-hour time intervals. Visual inspection using a beta-galactosidase assay indicated an increased number of senesced cells for keratinocytes and melanocytes during each successive irradiation time interval. Increases were highest during the transition from 8-hour and 24-hour exposure times in both lines, while 24-hour and 48-hour showed little variance. Melanocytes exhibited a trend of slightly fewer senescent cells compared to keratinocytes for all exposures performed. For both cell types, a Mann-Whitney rank sum analysis showed a statistical significant increase in senescent cells when comparing treatment and control cells for 8, 24, and 48 hour intervals. Cellular observations during post-irradiation indicated no visible morphological changes or differences in cell densities between treatment and controls for any time period of exposure. Future studies will investigate the accumulation of reactive oxygen species and determine if antioxidants such as Vitamin E can mitigate radiation-induced cell senescence. These studies will provide further insight into understanding the influences of ionizing radiation on living cells. **(11)**

Akers, Natalie,* and **Amy J. Reese.** Cedar Crest College, Allentown PA 18104. *Characterizing Rhodotorula fungal strains by a genotypic approach.* Fungi are 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* – fungi that can cause serious problems in immunocompromised individuals. This research is focused on *Rhodotorula*, using previous *Cryptococcus* studies as a model. *Cryptococcus* has been genotyped using multi-locus sequencing typing and the analysis of seven signature gene sequences. This has allowed strains to be classified based on genomic differences. We hypothesize that *Rhodotorula* can be genotyped as well, using the primers designed for the seven loci of *Cryptococcus*. One set of primers has been used to successfully amplify the first gene from our control *Rhodotorula* strain and we are in the process of applying this approach to the other genes and other 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. **(39)**

Allen, P.[1], K.M. Klemow[2]*, T. Mourad[3], and C. Smith[3]. [1]Cornell Lab of Ornithology, Ithaca, NY 14850, [2]Wilkes University, Wilkes-Barre, PA 18766, [3]Ecological Society of America, Washington, D.C. 20036 *Data Exploration in the Ecology Classroom: The Science-Pipes Approach* – Ecology instructors are increasingly incorporating active-learning strategies in their courses. One particularly promising approach involves providing access to ecological data that students can analyze and use to draw inference. Unfortunately, large-scale datasets are difficult to locate, and tools to facilitate visualization are often hard to master. To address those issues, the Ecological Society of America (ESA) has partnered with Science Pipes to create learning modules within ESA's EcoEd Digital Library. During the past year, a Science-Pipe based protocol was created to enable students to quickly generate life tables and survivorship curves based on birth and death data collected from cemeteries. This presentation will discuss the Science-Pipes architecture and workflow system, and will demonstrate how the system can be used to facilitate student learning of complex ecological concepts - using the cemetery demography module as an example. **(67)**

Anderson, Derek* and **Wendy Boehmler.** York College of Pennsylvania, York, PA 17405. *Investigation of Syntaxin 3B in Developing Zebrafish Embryos* – Syntaxin 3B is one of the four different isoforms generated by the differential splicing of the mouse Syntaxin 3 gene. It is essential for the exocytosis of synaptic vesicles in ribbon synapses of bipolar neurons in the retina. However, the mechanism by which it operates

and its developmental role are not fully known. Since zebrafish can be used to model many neurological defects, we focused our studies on the isolation and temporal expression of Syntaxin 3B throughout the development of zebrafish embryos. Using a reverse-transcription polymerase chain reaction (RT-PCR) strategy, we determined Syntaxin 3B is expressed during specific developmental stages. We also found robust and isolated expression in the eye tissue of adult zebrafish. It will be of interest to determine the spatio-temporal expression pattern of the gene throughout development using the power of whole-mount *in situ* hybridization. **(47)**

Anderson James*, Walter E. Meshaka, and **Pablo R. Delis**. Shippensburg University, Shippensburg, Pennsylvania 17257. *A Riverfront Population of the Eastern Garter Snake, Thamnophis s. sirtalis, in South-Central Pennsylvania.*- A population of the Eastern Garter Snake, *Thamnophis s.sirtalis*, was studied during March-October 2010, along the Susquehanna River, Dauphin County, Harrisburg, Pennsylvania. We determined the morphometrics and clutch characteristics of this population situated in a heavily urbanized setting. Using opportunistic searches and hand capture, 80 snakes (9 juveniles, 38 females and 33 males) were collected, yielding a sex ration of 0.53:0.47 among adults. Mean adult male snout-vent length (35.3 mm) was significantly smaller than that of females (47.2 mm). The basking need, early season, and the sparce verdure best explained the high proportion of (91%) snake captures on and between the exposed rocks along the berm during April-May. Clutch size averaged 20 young and increased with the body size of the female. Young were produced by August. Body size dimorphism was typical of the species generally; however, the mean body size of adult females at this site was more similar to other Pennsylvania sites that also had high Garter Snake densities. Early maturity, high fecundity, broad diet, and crypsis provided this species with a colonizing advantage; becoming nearly the exclusive snake, thriving in a heavily human-impacted along the riverfront of the city. **(175)**

Aponte, Sabrina*, Allysa Byrd, Elissa Colledge, Brittany Smith, Frank Manaquale, Sarah Landis and **Edward P. Levri.** Penn State Altoona, Altoona, PA 16601. *The effect of light intensity on the geotactic behavioral response of the New Zealand mud snail (Potamopyrgus antipodarum)*. -The New Zealand mud snail (*Potamopyrgus antipodarum*) is positively geotactic when exposed to light but shows little evidence of geotaxis when in the dark. The purpose of this study was to determine if varying the intensity of light affects the magnitude of the geotactic response in the snail. Snails were placed in a behavioral chamber and oriented vertically in direct sunlight, shade, and in complete darkness. The proportion of individuals moving down in each treatment was determined. Snails were dissected to determine size, gender, reproductive condition, and infection by trematode parasites. Preliminary analysis of the data suggests that intermediate light intensity results in an intermediate geotactic response. This suggests that the geotactic response of the snail is not an "all or none" response. **(157)**

Axe, Joshua* and **Jessica Nolan**. York College of Pennsylvania, York, PA 17403. *A Study of the Movements of Red-Bellied Turtles, Pseudemys rubriventris, and Red-Eared Sliders, Trachemys scripta elegans, in Lake Marburg, York County, PA* – Populations of both red-bellied turtles, a native, threatened species, and red-eared sliders, an invasive species, are found within Lake Marburg, York County, PA. Given their similar size and habitat requirements, red-eared sliders could potentially be competing with red-bellied turtles for resources. To begin to determine if competition is occurring, the movements of individuals from both turtle species were monitored. Starting in May 2011, Wildlife Materials transmitters were attached to one red-bellied turtle and four red-eared sliders. The location of each turtle was determined with a Field Marshal 1000 receiver a minimum of once per week between May and October and once per month in November and December. Red-eared slider movements were focused in one large cove or two smaller adjacent coves, whereas the red-bellied turtle moved throughout a large portion of the lake. Given the limited range of the red-eared slider, this preliminary study indicates that there was less overlap in the distribution of the two species than previously hypothesized. Further research on a larger number of turtles could clearly define the home-range size of red-bellied turtles and red-eared sliders and the extent to which their movements in the lake intersect. **(177)**

Bacigalupo, Jorge A.* and **Carl R. Pratt.** Immaculata University, Immaculata, Pennsylvania 19345. *Control of Gestational Diabetes via the use of Insulin Eye Drops: A Mouse Model*-This study was comprised of two phases (1) initial establishment of insulin in eye drops as an effective method for controlling induced diabetes (hyperglycemia) in mice and (2) effectiveness of these eye drops in controlling gestational diabetes in mice. Hyperglycemia was induced using the anesthetic Avertin™. Once hyperglycemia was confirmed, insulin was introduced via eye drops and blood glucose levels were monitored. Initial studies using non-pregnant mice demonstrated that Avertin™ effectively induced hyperglycemia (200–320 mg/dl glucose) and subsequent administration of insulin eye drops lowered blood glucose to normal range within 20 minutes. Mice were further used to investigate the efficacy of this treatment regime for gestational diabetes. Pregnant mice were fed a high glucose diet in conjunction with Avertin™, hyperglycemia was observed, and then brought under control by the administration of insulin via eye

drops. This work may be of wider interest given that gestational diabetes is common during human pregnancy and administration of insulin eye drops rather than through injection may offer comparable outcomes with greater acceptance by patients. **(104)**

Bahr, Elizabeth* and **Jodi L. Yorty.** Elizabethtown College, Elizabethtown, PA 17022. *Decrease in CD8$^+$ T cells Following Treatment of Mice with Exogenous Corticosterone*- Corticosterone (CORT) belongs to a family of steroid hormones known as the glucocorticoids. CORT is produced in vivo in response to physical and psychological stress and has immunosuppressive qualities. This study quantified the effects of exogenous CORT on CD8$^+$ T cells in mice. CORT was administered in the drinking water of C57BL/6 mice for time intervals ranging from 12-120 hours. Following treatment spleens were harvested and processed, splenocytes were counted, and CD8$^+$ T cells were quantified by flow cytometry. Spleens from mice treated with CORT were significantly smaller than untreated mice. A marked decline in CD8$^+$ T cells, specifically those classified as CD44 high (activated), was observed. The loss of T cells was greater the longer the mice were treated with CORT. It is likely that CORT treatment induced apoptosis of the CD8$^+$ T cells. Thus, the frequency of total and CD8$^+$ T cells undergoing apoptosis was assessed by flow cytometry using annexin V and propidium iodide staining. Current and future studies will focus on the effect of CORT on an antigen-specific CD8$^+$ T cell immune response. **(16)**

Balaban, Amanda* and **Bernard Fried.** Lafayette College, Easton, PA 18042. *Miracidial infection of Echinostoma caproni in neonatal and adult Biomphalaria glabrata snails*-- *Echinostoma caproni* is an economically important trematode that cycles between gastropod intermediate hosts and vertebrate definitive hosts. In this study, we focused on that part of the life cycle that occurs in the first intermedaite gastropod host. We used a *Biomphalaria glabrata* snail model for our studies of this phase of the life cycle. Herein, we investigated the infectivity of different snail ages of *B. glabrata* to infection with *E. caproni* miracidia. The snails used were neonates (about 0.75 mm), young adults (about 10.0 mm) and adults (about 15.0 mm). We found that neonatal snails were capable of becoming infected with *E. caproni* miracidia but survival of the exposed neonates was significantly less than that of the adult snails. Five weeks after miracidial exposure, 20 to 30 % of the surviving snails in all groups had confirmed infections. We hypothesize that the higher death rates in neonates was due to the increased susceptibility of this stage to miracidial infection and subsequent larval development of *E. caproni*. The results of our study suggest that neonatal *B. glabrata* may serve as a reservoir for trematode infections and such young snails should be considered in attempts to eradicate trematodes from their snail hosts. **(142)**

Ballreich, Tatiana* and **Marianne Staretz.** Cedar Crest College, Allentown, Pa 18104. *Fluorescence Analysis of the Interactions of Bilirubin, Fatty Acids and Human Serum Albumin.* The current study uses fluorescence spectroscopy to investigate the binding of bilirubin and albumin protein and the effect of different fatty acids on the binding. Human Serum Albumin (HAS) is a protein found in human blood plasma that accounts for approximately half of all protein in the blood. It has several important functions one of which is to serve as a transport protein for a variety of endogenous and exogenous compounds. The endogenous compounds that albumin is known to bind to include bilirubin and fatty acids. If two compounds bind to bilirubin, it is possible that one can be displaced by the other. The effect of fatty acids on the binding of bilirubin to albumin has not been previously investigated. Understanding how fatty acids may affect the binding of bilirubin to albumin may provide important insight regarding toxic conditions that can result from the buildup of bilirubin in the blood as can commonly occur in infants. The results of these analyses of the effects of fatty acids on the binding of blirubin to HSA will be presented. **(54)**

Barna, Laura* and **Tammy Tintjer.** King's College, Wilkes-Barre, PA 18711. *Foraging Preferences of Castor canadensis in a Leatherleaf-sedge Wetland Habitat* –This experiment focuses on the foraging preferences of *Castor canadensis* (North American beaver) in a newly formed habitat in a Leatherleaf-sedge wetland. *C. canadensis* can drastically alter the biotic and abiotic environment surrounding its habitat to better suit its needs 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 analyses the tree felling activity of a newly established beaver family. 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 in the particular habitat analyzed the preferred tree was *Amelanchier laevis* (Allegheny serviceberry). An analysis of the foraging preferences of *C. canadensis* can provide a better understanding of how the species selects its environment, what environments suit the species best for habitat formation, and what effects on community structure the species exerts. **(171)**

Barnard, T.*, E. Schramm, B. Naberezny, D. Bruns, and **K. Klemow.** Institute for Energy and Environmental Research of Northeastern PA, Wilkes University, Wilkes-Barre, PA 18766. *Surface water quality monitoring to address the impacts on Marcellus Gas development on small and medium streams in northeast Pennsylvania* – A conceptual model has been developed to address impacts of Marcellus Shale gas development on environmental resources in Pennsylvania. For surface waters, this model considers activities that

cause the introduction foreign constituents, temporary or permanent mobilization of sediments, nutrients and trace metals, alteration of flow regimes, and disruption of habitat. Within subwatersheds of our study streams in northeastern PA, we have quantified the activities that may cause impacts including drilling, hydrofracking, and the construction of access road, well pads, water supply, pipelines and temporary staging areas. Study sites include those potentially impacted by gas wells and/or pipeline construction. We then developed a surface water quality monitoring program that measures parameters that may respond to the impacts, involving sampling for chemical analysis, continuous monitoring with sensors, and macroinvertebrate sampling for species presence/absence and diversity. The program relies heavily on historical and ongoing monitoring conducted by PADEP, SRBC and other organizations. This has required the development of data management tools for geospatial analysis of large datasets. Data collected to date indicates much of the response is event-driven or temporary in nature. Ongoing work will develop tools to integrate continuous monitoring data with conventional grab sampling. **(65)**

Barnhart, Aaron, Lee Blair, Jennifer Kates, Jennifer Paull, Jessica Pavlikowski, Andrew Roccograndi, Gregory Sofia and **Cosima Wiese***. Misericordia University, Dallas, PA. 18612. *Effect of pH on Growth of the Aquatic Plant Duckweed (Lemna spp.)*. - Acidic precipitation and acid mine drainage remain serious problems in Northeast Pennsylvania, resulting in the acidification of both terrestrial and aquatic ecosystems. Duckweed (*Lemna spp*.) grows ubiquitously in freshwater ecosystems and has been used as a model plant to investigate the effects of a variety of aquatic pollutants on aquatic ecosystems, including acidic conditions. The primary focus of this research project is to establish the effects of acidic pH on growth and metabolism of duckweed. Preliminary experiments were carried out to determine the pH at which toxicity occurs and to establish a pH range in which duckweed plants are metabolically impacted. Additionally, effects of nitric and sulfuric acid were compared to evaluate their impacts on growth and photosynthesis. Duckweed plants were grown in aerated flasks with a modified Hoagland's solution in an environmental chamber with a 16 hr photoperiod for 7 days. Biomass and growth rate were measured and photosynthetic capacity was analyzed by quantifying chlorophyll a, b and total chlorophyll. Initial results demonstrate that exposure to acidic pH reduced biomass and growth rate as compared to controls. Additionally, chlorophyll content was reduced in acidic pH, which likely results in a decreased photosynthetic capacity in the duckweed plants. **(187)**

Bartle, Sarah*, Walter E. Meshaka, and **Pablo R. Delis**. Shippensburg University, Shippensburg, Pennsylvania 17257. *Comparison of reproductive characteristics between two mole salamanders from South Central Pennsylvania: implications for conservation*. -Life history traits, such as fecundity, are critical in determining the biotic potential of species with conservation concern. Eleven female Jefferson Salamanders (*Ambystoma jeffersonianum*) and five female Spotted Salamanders (*A. maculatum*) were collected from the same vernal pool in south-central Pennsylvania for comparison of reproductive characteristics. Mean clutch size of the Jefferson Salamander (169.5 eggs) was larger than that of the Spotted Salamander (130.8 eggs) despite an 8.9 % smaller body size. Greater fecundity could provide the Jefferson Salamander with an added advantage in areas of sympatry with the Spotted Salamander where it is known to be a superior competitor and predator of the Spotted Salamander at the larval stage. **(173)**

Bauza, Jacqueline*, Brittany Sohle, and **Garrett Barr.** King's College, Wilkes-Barre, PA 18711. *Anti-Predator Behavior Exhibited by Stream Macroinvertebrates When Exposed to Multiple Predators* – Field studies show that larval salamander activity is aperiodic in fishless streams but nocturnal in streams with fish. Laboratory studies show this behavioral response to fish results in lower daytime prey consumption by larval two-lined salamanders (*Eurycea bislineata*). Interestingly, the presence of salamanders results in brook trout (*Salvelinus fontinalis*) capturing more invertebrate prey. The objective of this study is to test whether the anti-predator behavior of macroinvertebrates results in indirect effects that explain the impacts of salamanders and trout on each others' feeding. We hypothesize that invertebrates alter their microhabitat use (top or bottom of artificial cover objects) differently in response to each predator, and that it will favor trout feeding when in the presence of both predators. We will present results on the effects of salamanders and trout on invertebrate habitat use as measured using time-lapse videography of 24 hr trials in laboratory microcosms. **(161)**

Beck, Laura M.*, Brad E. Engle, and **M. Dana Harriger.** Department of Physical and Life Sciences, Wilson College, Chambersburg, PA 17201. *A Measure of Electrolyte Containing Sports Drinks: Effects on Physiological Parameters Before, During, and After Exercise* - Electrolyte-containing sports drinks replace electrolytes and fluids which are lost during exercise through perspiration. Studies indicate that their consumption decreases dehydration and maximizes aerobic performance during a period of exercise due to electrolyte content. The increased hydration levels result in decreased heart rate, blood pressure and respiration rate. This study measured the effects of sports drinks on these physiological parameters before, during, and after intense exercise. Five Wilson College student-athletes and faculty were enrolled in this study and were required to consume a specified amount of drink, normalized for each participant, during each exercise session. Hydration, heart rate, blood pressure, and respiration rate were measured before, during, and after exercise at each session. Three different drinks were consumed: water and two formulations of Gatorade, G2Pro which contains high electrolyte amounts and G2 which contains lower electrolyte levels. It is expected that the highest electrolyte

content will be the most effective in maintaining hydration and have the most positive impact on the physiological parameters. Results of this study will be analyzed using a MANOVA and will help us better understand the impact that electrolytes have on physiological parameters during exercise. **(75)**

Behmer, Philomena*, **Danielle Farnell,** and **Carol Ely Hepfer**. Millersville University, Millersville, PA 17551. *Identification of Sex-Specific Genetic Sequences in the Squid Doryteuthis pealeii* - Genetic differences are responsible for the existence of distinct sexes in most species. While an XY chromosome system determines sex in many mollusks studied to date, XO and ZW mechanisms have also been reported for this phylum. Sex determination in cephalopods has not been elucidated. To investigate the existence of sex-specific genetic sequences in squid, we used amplified fragment length polymorphism (AFLP) PCR along with genomic representational difference analysis (gRDA). Pools of male and female genomic DNA were separately cleaved with restriction enzymes. The addition of adaptors allowed PCR amplification of all resulting fragments. Selective amplification of AFLP fragment subsets was accomplished using PCR primers with three additional 3' nucleotides that bind genomic sequences adjacent to the adaptors. Electrophoretic analysis of selective AFLP products on 2% agarose gels revealed several prospective male- and female-specific bands. When AFLP products from the female DNA pool were hybridized with fragmented male genomic DNA to remove common sequences, enrichment for two female-specific PCR products was observed. Candidate sex-specific bands were isolated and cloned into bacteria to enable sequence analysis and the development of specific PCR primers that can be used to compare individuals and verify that these DNA sequences are truly sex-specific. **(128)**

Beidel, Emilee*, Laura F. Altfeld, and **Deborah S. Austin**. Wilson College, Chambersburg, PA 17201. *An Application of the Optimal Defense Theory: Analyzing the Defenses of A Marine Sponge, Axinella polycapella, Against Predatory Reef Fish* –Sponges are one of the earliest multicellular organisms still in existence. Although lacking specialized systems, nerves, and musculature, sponges are highly adaptive to harsh ecological variables present within their natural environments. Ecological threats such as competition, predation, and biofouling are especially prevalent in Caribbean coral reef communities where sponge populations thrive. As is common with many marine invertebrates, sponges lack obvious mechanisms of protection and therefore may employ species-specific physical or chemical defenses. Spicules, a sponge structural component, are a proposed source of physical defense. Additionally sponges may also implement chemical defenses in the form of secondary metabolites. The purpose of this research is to first determine the primary defense implemented by the branching sponge *Axinella polycapella*. The optimal defense theory, stating that organisms allocate defenses to best promote individual fitness, will then be applied to explicate the intra-specimen variation of defense distribution within the sponge. Feeding assays with *Holacanthus tricolor* and *Thalassoma bifasciatum* will be conducted to determine the efficacy of each defense against natural predators. Chemical deterrence is the hypothesized primary means of defense. In accordance with the optimal defense theory, the secondary metabolites are expected to be most concentrated in the branch tips of *Axinella polycapella*. **(162)**

Bender, Courtney* and **André P. Walther**. Cedar Crest College, Allentown, PA 18104. *Phosphorylation of Replication Protein A Plays a Role in Regulating Checkpoint Release in the Presence of Unrepairable DNA damage in Saccharomyces cerevisiae* – Checkpoints arrest cell cycle progression in the presence of DNA to allow repair pathways to function, but once the DNA is repaired, the checkpoint is turned off and the cell cycle resumes. If the damage is unrepairable, the cell eventually overrides the checkpoint and the cell cycle resumes in the presence of damaged DNA through a process called adaptation. The single-stranded DNA binding protein Replication Protein A (RPA) is phosphorylated in response to DNA damage and has been implicated in checkpoint activation. To investigate the effects of RPA phosphorylation on checkpoints and adaptation, phosphorylated amino acids of RPA were mutated to alanines (*RPA-ala*) to mimic constitutively unphosphorylated RPA, or aspartic acids (*RPA-asp*) to mimic constitutively phosphorylated RPA. Unrepairable DNA damage was induced to activate the G2/M checkpoint and progression through the cell cycle was monitored for 24 hours. The *RPA-asp* strain adapted normally, while the *RPA-ala* strain showed a defect in adaptation. Strains that lack a functional Ku70p or Cdc5p, proteins involved in the cellular response to DNA damage, fail to adapt, but this defect is suppressed by the *RPA-asp* mutation. Our results demonstrate that RPA phosphorylation plays a critical role in releasing cells from the G2/M checkpoint. **(30)**

Bender, Tonya J.*, Catherine T. Santai, and **Deborah S. Austin**. Wilson College, Chambersburg, PA 17201. *Characterization of Algae Bio-oil Produced by Microwave-Assisted Pyrolysis: A Study of the Potential for Algae Bio-oil as an Alternative Fuel Source* – Algae are a fast growing, renewable, and sustainable source of biomass feedstock. Algae biomass can be converted into bio-oil through a process known as microwave-assisted pyrolysis (MAP), a type of thermolysis requiring temperatures between 500-700°C in the absence of oxygen. Algae-derived bio-oils have been shown to have comparable physical properties of petroleum diesel, including density, viscosity, and higher heating value (HHV). During this research algae biomass collected from mono and mixed cultures were each subjected to MAP, in which different algae-derived bio-oils were produced. Two mono cultures included the species *Chlorella vulgaris* and *Scenedesmus*, and two mixed cultures included a filamentous green algae

mixture and a green microalgae mixture. The algae-derived bio-oils were characterized in terms of density, viscosity, and higher heating value (HHV). HHV is a measure of the heat of combustion determined using bomb calorimetry. Physical properties of algae-derived bio-oils are compared with those of biodiesel prepared by the Department of Environmental Studies at Wilson College and with commercial grade diesel. The results from this study provide support for the use of algae biomass as an alternative fuel source. **(119)**

Bernard, Alyssa J.*, Brad G. Stiles, and **M. Dana Harriger.** Wilson College, Chambersburg, PA 17201. *Antimicrobial Effects of Essential Oils for the Control of Oral Bacteria in the Prevention of Periodontal Disease in Canines* - Periodontal disease affects any breed of dog, and if left untreated, can result in life-threatening complications. This disease is initiated by aerobic bacteria in the canine mouth that grow just beneath the gumline. These bacteria remove oxygen from this niche, enabling the subsequent growth of anaerobic bacteria that can become very tissue destructive. There are four stages associated with periodontal disease, but the first stage, gingivitis, is reversible. Essential oils from anise seed, myrrh, spearmint, and clove bud possess antimicrobial properties against aerobic bacteria. This study investigated essential oil-based inhibition of problem causing bacteria. The Kirby-Bauer Disc Diffusion Assay was used to test each oil at various dilutions for inhibition of aerobic bacterial growth using pure cultures of *Escherichia coli*, *Neisseria canis* and *Staphylococcus epidermidis,* as well as mixed cultures from whippet gingival/tooth samples. Data were analyzed using a Two Way ANOVA, which compared the dilution of each oil with the diameter of inhibition. Results demonstrated that clove bud oil was the most effective, even at the lowest concentration, while myrrh oil was the least effective. Results of this study suggest that essential oils might be an effective alternative against aerobic bacteria accumulation in the mouth leading to periodontal disease. **(144)**

Black, Sarah E.*, Justin N. Weilnau, Michael P. Schmidt, Kimberly L. Holt, Lindsay M. Carl, Collin J. Straka, Walter A. Patton, Anderson L. Marsh and **Courtney M. Lappas.** Lebanon Valley College, Annville, PA. *ZnS nanocrystal cytotoxicity is influenced by capping agent chemical structure and duration of time in suspension* - Due to their characteristic physical and optical properties, including their size, intense fluorescence, broad excitation, narrow emission, and resistance to photobleaching, semiconductor nanocrystals are potentially useful for a variety of biological applications including molecular imaging, live-cell labeling, photodynamic therapy and targeted drug delivery. In this study, zinc sulfide (ZnS) semiconductor nanocrystals were synthesized in the 3 to 4 nm size range with selected capping agents intended to protect the nanocrystal core and increase its biological compatibility. We show that the biocompatibility of zinc sulfide nanocrystals with primary murine splenocytes is influenced by the chemical structure of the outer capping agent on the nanocrystal. Additionally, the cytotoxicity of ZnS nanocrystals increases markedly as a function of time spent in suspension in phosphate buffered saline. These data suggest that the potential therapeutic and/or biological use of ZnS nanocrystals is inherently dependent upon the proper choice of capping agent, as well as the conditions of nanocrystal preparation and storage. **(99)**

Blanschan*, Joseph S. and **Carolyn F. Mathur**. York College of Pennsylvania, York, PA 17403. *Prevalence of Staphylococcus aureus on the Door Handles of Assisted Living versus Independent Living Resident's Rooms in a Retirement Facility* - *Staphylococcus aureus* (SA) is a leading cause of both nosocomial and community-acquired infections, although little is known about its occurrence in retirement facilities. While nasal carriage is the most common reservoir of the bacterium, fomite reservoirs could also be significant, and studies have shown that SA is able to live on inanimate surfaces for several months. Elderly individuals are particularly vulnerable to SA infection due to lowered immunity, poor personal hygiene, and crowded living environments, such as can occur in a retirement facility where they may rely on others for personal care. This study compares the occurrence of SA on assisted living (AL) versus independent living (IL) door handles at the point of entry to each resident's room in a retirement facility. Door handles were swabbed (n=60), and the swabs incubated in staphylococcus-enrichment broth. SA was then detected by positive results in mannitol salt agar, coagulase, and catalase tests. Antibiotic resistance was also assessed by the presence of β-lactamase. Forty percent of AL door handle cultures were positive for both SA and β-lactamase, as compared to only 3.3% of the IL door handle cultures (Fishers exact two tailed test, $p = 0.0004$). This study suggests that AL resident's rooms may require additional disinfection protocols compared to those used in IL resident's rooms. **(83)**

Boland, Joseph R. *, Matthew E. B. Hansen, Craig E. Stanley, Jr., and **Rob J. Kulathinal.** Temple University, Philadelphia, PA 19122. *Genomic signatures of sexual selection* - Sexual selection can lead to the maintenance of multiple alleles in a population and, as a result, can play a large role in population genetic diversity. We addressed the degree to which sexual selection maintains allelic diversity in *Drosophila melanogaster* using a bioinformatics, windows-based analysis of whole genome sequences from ~300 individuals from across worldwide populations. Overall, regions under strong levels of non-purifying selection, based on Tajima's D and Fu and Li's D, were found to be partitioned unequally throughout the chromosomes (3R>2R>3L>2L>X). RNA-seq data from the modENCODE project were then used to identify genomic regions with differential expression between the two sexes. By triangulating regions under strong non-purifying selection that contain high allelic diversity and display a

strong sexual bias, we determined the fraction of allelic diversity that may be maintained by sexual selection. Gene annotation data were also used to identify enriched ontological classes related to reproduction associated with genes found within identified candidate regions. **(127)**

Booterbaugh, Aaron* and **Ahmed Lachhab.** Susquehanna University, Selinsgrove, PA 17870. *Measuring Bathymetry and Sediment Deposition in Walker Lake, PA with use of Ground Penetration Radar* -The use of Ground Penetrating Radar (GPR) to perform bathymetry mapping on lakes has historically been performed successfully, especially in frozen environments. In recent years, the GPR has undergone excessive development and now can be implemented in fresh water lacustrine environments to investigate bathymetry, sediment thickness and the rate of deposition. A field experiment which implemented GPR to investigate these aspects, was carried out on Walker Lake, near Troxelville, PA. Walker Lake was formed in 1970 when Middle Creek, a tributary to the Susquehanna River, was impounded. The study made use of a 400 MHz antenna which gives higher resolution for shallow exploration, making it ideal for Walker Lake. High resolution profiles were produced along several transects revealing the exact bathymetry and sediment thickness. These profiles were then processed to generate a bathymetry map of the upstream portion of Walker Lake and total sediment volume. The approximate 1970 topography, found through GPR surveys, was compared to 1970 GIS topography surveys for verification. It was found that sediment accumulated more rapidly in the troughs of old stream channels and that sediment thickness gradually increases toward the inlet of the lake, as expected. **(148)**

Bove, Daniel*, and Howard P. Whidden. Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA 18301. *Medullary Variation in Tail Hairs in the Family Sciuridae* – Hair analysis is a research tool for identification of mammalian species and is widely used in forensics and wildlife research. This study examined the differences in hair morphology of seven species of North American squirrels (Family Sciuridae). Hair samples were examined under a light microscope for morphological differences between the lateral tail hairs and dorsal guard hairs. We noted differences in medullary structure between dorsal and tail hairs in the Red Squirrel and the Eastern Gray Squirrel; tail hairs had a continuous medulla throughout the hair whereas the dorsal guard hairs had a multiserial medulla. In contrast, medullary morphology was similar in dorsal guard hairs and lateral tail hairs in the Eastern Chipmunk, Fox Squirrel, Woodchuck, Southern Flying Squirrel, and Thirteen-lined Ground Squirrel. **(109)**

Bove, Daniel J.*, **Melissa Shaw**, and **Jane E. Huffman**. East Stroudsburg University, East Stroudsburg, PA 18301. *The Occurrence of Tick-borne Pathogens in Black Bears (Ursus americanus) in New Jersey* - The purpose of this study was to determine the occurrence of tick-borne pathogens in black bears (*Ursus americanus*). Blood and tick samples were collected over a two-year period from 2010 – 2011. Two hundred and thirty blood samples and 624 ticks (414 *Dermacentor variabilis* and 220 *Ixodes scapularis*) were examined for *Anaplasma phagocytophilum, Francisella tularensis, Rickettsia rickettsii, and Babesia spp*. Of the 231 blood samples all were negative for *F. tularensis* and *R. rickettsii*. Two (0.01%) blood samples were positive for *A. phagocytophilum* and 84 (41.7%) blood samples were positive for *Babesia spp*. All of the tick samples were negative for *F. tularensis* and *A. phagocytophilum*. Five *D. variabilis* (0.01%) ticks were positive for *R. rickettsii*. **(146)**

Brigman, Floyd R.,* and **Eric P. Ingersoll.** Penn State Abington, Abington, PA 19001. *Expression of Matrix Metalloproteinases 14 and 24 During Sea Urchin Development*. – Matrix metalloproteinases (MMPs) are a group of metal-containing enzymes that degrade extracellular matrix molecules. They are involved in a number of normal and pathological processes including extracellular matrix remodeling, cell invasions, rheumatoid arthritis, and tumor cell metastasis. Our previous studies suggest that MMPs play an important role in skeleton formation during sea urchin development. We have identified a number of MMP genes in the sea urchin genome database for further investigation. Using RT-PCR, we determined if any of seven MMP genes were expressed in prism stage embryos. Two MMPs, MMP14 and MMP24, were expressed in these late-stage embryos. We then examined the expression of these two MMPs throughout development. MMP14 shows a dramatic increase in expression at the beginning of gastrulation while MMP24 expression increases at a slow rate throughout most of development. Our future studies will investigate the spatial expression patterns of these genes and the role of these enzymes in sea urchin development. **(59)**

Brophy, Shane*, Nick Triano, Chris Kotansky, Harsh Patel, and **Shaobiao Cai. Penn State University, Hazleton, PA 18202.** *Bridge Classroom Project to Real World Technology Applications* – The project is to design and prototype a system to explore the applications of industrial technologies in system control and balance robotics, and to gain in depth understanding engineering design process, manufacturing process as well as the method of how a complex system can be modeled and the way of how basic science, mathematics, and engineering principles can be applied to solve real problems. For easy control and test purpose, the system is designed to take a shape of "Segway" with mechanism de-

sign and electronic control system integrated. The project helped to promote the engineering learning, and bridged the classroom theories to real world technologies applications. Preliminary driving test of the system has been conducted and the effectiveness has been verified. **(81)**

Brown, Janice* and **Sheryl L. Fuller-Espie**. Cabrini College, Radnor, PA 19087. *Effects of Pathogen-Associated Molecular Patterns on the Prophenoloxidase Pathway using Eisenia hortnesis* — The main objective of this research was to determine if coelomocytes of the earthworm *Eisenia hortensis* have the capacity to activate the prophenoloxidase (PPO) cascade, as part of a humoral mechanism of innate immunity, upon stimulation by pathogen-associated molecular patterns (PAMPs). PAMPs utilized included lipopolysaccharide, β-1,3-glucan (laminarin), peptidoglycan and lipoteichoic acid, all of which are associated with bacterial and fungal pathogens encountered in the natural habitat of *E.hortensis*. Enzyme activity was measured after 24 or 48 hours using the substrates L-3,4-dihydroxyphenylalanine (L-DOPA) (diphenolase activity) and hydroquinine monomethyl ether (4HA) (monophenolase activity). The chromogenic nucleophile, 3-methyl-2-benzothiazolinone hydrazone (MBTH), was used to measure spectrophotometric absorbance at 490 nm at 15 minute intervals for 2 hours. We observed that upon incubation of the coelomocytes with all of the PAMPs, PPO was converted to phenoloxidase, an effect that was enhanced when acellular coelomic fluid was included during the incubation period. These results confirm that the PAMPs selected for this *in vitro* study induced the activation of the PPO cascade in earthworm coelomocytes. **(43)**

Brownlee, Sarah* and **DeeAnn Reeder.** Bucknell University, Lewisburg, PA 17837. *Assessing Behavioral Shifts in Bats Affected by White-Nose Syndrome*- In 2006 a fungus was found growing on the muzzles and forearms of bats in New York. This fungus has now been connected to the death of an estimated 5.7 million or more hibernating bats in the Northeastern United States and Canada. The relationship between the fungus, *Geomyces destructans,* and the disease, known as White-Nose Syndrome (WNS), is now at the forefront of bat research. Research on the behavior of healthy hibernating bats is limited, and even less is known about the behavior of WNS-affected bats. Previous work has shown that bats with WNS are arousing to euthermic temperatures more frequently than normal from hibernation. We examined the behavior of bats during these energetically expensive arousals. To monitor the behavior of these bats infrared motion-sensitive cameras were deployed in captivity. The duration and frequency of behaviors was measured, including grooming, non-flight locomotion and flying. Bats with WNS were shown to be more active during arousal bouts and a larger percentage of that activity was spent grooming rather than engaging in other activities. This suggests that WNS-affected bats are expending more energy (fat) per arousal than unaffected bats, and that they are responding to the fungal infection by grooming. This increase in grooming may also help spread the fungus by passing in through their digestive tracks. **(9)**

Butchkoski, Calvin M.* Pennsylvania Game Commission, 4294 Eberle Road, Petersburg, PA 16669. *Appalachian Summer Bat Roost Counts in Pennsylvania* -The Appalachian summer roost count is a citizen science program where participants count bats at summer roosts. This information is proving useful as a tool to track the effects of Bat White-nose Syndrome (WNS) within the state. This past year 294 counts were conducted at 159 sites. One-hundred and twenty-one of these sites had counts of bats for multiple years. In 2011 there was a 69 % statewide decline from historic highs. Ten of these sites no longer contain bats and 61 have counts less than 50% of original high counts. Of the sites where species have been identified by staff or participants, big brown bats (12 sites) are down 15.3 % and little browns (89 sites) are down 70.3% when compared to historic counts. Mammal staff has monitored 10 little brown sites in central Pennsylvania counties since 2009 where volant counts have dropped from 17,340 to 1,218 a 93% decline. Continued statewide declines are expected in the next few years as WNS impacts western Pennsylvania counts. **(6)**

Cabrey, Carolyn* and **Megan Rothenberger.** Lafayette College, Easton, PA 18042. *Plankton dynamics and eutrophication in Raritan Bay: linkages between harmful algal bloom (HAB) species and long-term nutrient enrichment* – Environmental monitoring studies of plankton biomass and species composition in relation to nutrients can provide important documentation of the effects human activities on the functioning of coastal ecosystems. The objective of this study was to examine natural relationships between phytoplankton and zooplankton species composition and environmental parameters in Raritan Bay, a eutrophic estuary. Water quality data and samples for analysis of chemical and biological parameters were collected for two consecutive years on a monthly basis at six sites. Ordination techniques, which order samples along axes expressing the main trends in the data, found that nitrate and soluble phosphorus concentrations are as much as 65 and 80 times higher, respectively, than concentrations reported in the literature for this system fifty years ago. Phytoplankton and zooplankton assemblages were strongly related to water temperature, nitrate, and ferrous iron concentrations, with expected seasonal changes in species composition. A total of 65 phytoplankton taxa were identified in samples, including nine harmful algal bloom (HAB) species. HAB species were most abundant in spring when nitrate and ferrous iron concentrations were highest. This study begins the first long-term monitoring study of Raritan Bay to include accurate and consistent data on phytoplankton and zooplankton species. **(193)**

Cameron, Ashley K.*, Clay E. Corbin, and **Karl W. Henry.** Bloomsburg University, Bloomsburg, PA 17815. *Analysis of disinfection methods to prevent cross-contamination of avian populations during collection of bite-force.* – Measuring bite-force on wild birds or lizards depends on a force apparatus that is used on multiple individuals of the same and different species. The risk of cross-contamination with normal oral flora of different species is unknown. To address this, we examined the possibility that bite-plates could harbor microbes following bite-force sampling. Also, we evaluated the efficacy of several disinfectants to remove transient microorganisms. Following capture and bite-force data sampling on birds, weswabbed the oral cavity of the bird as well as bite-force apparatus before after disinfection. These were used to inoculate BHI plates; replicates were incubated at 35C and 25C for 2d and then counted colonies. We found that only a smallportion of microbes from the oral cavity of birds transferred on to the bite force plates during sampling. Hence, the risk of contamination of subsequent individuals during sampling is possible. However, each of the agents tested either completely removed or significantly decreased microorganisms from the apparatus. Hence, while collecting behavioral performance data, such as bite-force, is interesting and important, we recommend routine disinfection during field study. **(154)**

Campbell, Laurel*, **Pablo R. Delis**, and **Walter Meshaka.** Shippensburg University, Shippensburg, Pennsylvania 17257. *Geographic Variation in Morphometrics and Life History Traits in Spring Peeper (Pseudacris crucifer) populations in South Central Pennsylvania* -The Spring Peeper (*Pseudacris crucifer*) is a small but locally abundant hylid frog in Pennsylvania. Despite its ubiquity, little is known about the life history of this species in Pennsylvania. In 2010 and 2011, we used night surveys to survey the populations and collect 25 amplexing pairs at Michaux Forest (MF) and 15 at Letterkenny Army Depot (LEAD), south central Pennsylvania. These two sites, 25 km apart, are forested habitats separated by a human-populated and disturbed valley. Sexual dimorphism was apparent; with females being 20.2 % larger than males at MF and 12.8 % at LEAD. Minimum body size at reproduction was smaller for males (21 mm SVL) and females (25 mm SVL) at MF than for males (25 mm SVL) and females (31 mm SVL) at LEAD.. Female reproductive effort, as a percentage of body mass, averaged 36.8 % at MF in 2011. Spring peepers in south central PA appeared to vary in morphometric and reproductive parameters between years and sites, which was consistent with an r-selected species. More sites and more years of research throughout the state will put to test these patterns and explain more of the temporal and spatial variation in those life history traits. **(174)**

Campbell, J. Michael and **Thomas Croushore-Kysor.** Mercyhurst University, Erie, PA 16546. *Method for taxon-specific measurement of algal lipids and biofilm development*- Methods were tested for quantitative analysis of neutral lipids and biofilm formation in a mixed assemblage of green algae grown in an experimental aeroponic algal production system. Intracellular lipids were detected in simple wet mounts of algal concentrates using fluorescent microscopy and Nile Red stain. Sequential photomicrographs taken of clumps of algae in the same field of view using bright field and fluorescent microscopy allowed enumeration of the frequency occurrence of lipid droplets in different types of algae. Extracellular polysaccharide biofilms associated with aeroponic algae were detected using Alcian blue stain and bright field microscopy, and we devised criteria for rating the extent of algal biofilm development. Progressive advancement of biofilm formation was often associated with aggregation of ciliated protozoans in algal clumps, and the ciliates appeared to be more important reservoirs for neutral lipids than the algae. **(116)**

Campion, Scott*, Shixiong, Hu, and **Michael Prestoy**. East Stroudsburg University, East Stroudsburg, PA 18301. *Generation of High Resolution Digital Terrain Models from NASA's Atmospheric Terrain Mapper (ATM) Light Detection and Ranging (LiDAR) System* – This study presents the processes and results from an effort by East Stroudsburg University to create high resolution (~20 centimeter) digital elevation models of the Wallops Flight Facility and the surrounding region, located in Wallops Island VA. LiDAR point data collected by NASA using their ATM system was transformed to the correct geospatial data frame and subsequently analyzed to classify each data point as one of a number of terrain types. These classifications were used to create a surface model (containing all terrain except for noise and water), and a ground model (containing only ground points, and excluding terrain features such as buildings and trees). Results were measured for accuracy using 244 photogrammetric control points covering the primary region of interest and were found to have a root mean square error of 20.71 centimeters. Future work will utilize these results to assess the impact of sea level rise on NASA assets and local habitats for endangered species such as the Piping Plover. **(136)**

Capouillez, William, Tracey Librandi Mumma, and John Taucher*, Bureau of Wildlife Habitat Management, Pennsylvania Game Commission, 2001 Elmerton Avenue, Harrisburg, Pennsylvania, 17110. *Pennsylvania Game Commission Wind Energy Voluntary Cooperative Agreement history and survey results summary* - The 2004 Pennsylvania Alternative Energy Portfolio Standards Act requires 18% of electricity sold to retail customers in Pennsylvania to come from renewable and advanced energy sources within 15 years. Due to the absence of comprehensive state regulation and overall lack of data regarding impacts of wind energy development on wildlife, the Pennsylvania Game Commission (PGC) worked

collaboratively with the wind industry to develop a Wind Energy Voluntary Cooperative Agreement in 2007. The Cooperative Agreement was developed in an effort to standardize bird and bat monitoring protocols and impact review methods associated with the development of wind energy projects. The Agreement between the PGC and cooperators requires a minimum of one year of pre-construction surveys and two years of post-construction mortality monitoring at wind sites with effort levels determined by using criteria outlined in the Agreement. The history of the Cooperative Agreement will be presented along with a summary of the bat surveys that have been conducted. The format and apparent success of the Cooperative Agreement has been praised as a clear example of the ability of wind energy developers and natural resource agencies to partner both on a national and state level. **(3)**

Clayman, Carly* and **J. Sidie.** Ursinus College, Collegeville, PA 19426. *Swim Motor Systems in Goldfish (Carassius auratus)* - The neural circuitry of swimming coordination in the central nervous system of goldfish was studied through the use of anesthetics. Anesthetic disruption of swim circuits was used to investigate neural coordination of individual fin systems. The influence of pharmaceutical anesthetics upon fin motion was studied in terms of CPGs, encompassed by spinal interneurons initiating rhythmic motor output. General anesthetics, acting on cell membrane proteins, along with local anesthetics, blocking Na^+ channels, were used. Fin motion was differentially rated on a scale of 4, normal movement, to 1, no movement. This behavioral observation has indicated a pattern of loss of fin motion: anal fin, pelvic fin, dorsal fin, caudal fin, pectoral fin. The sequential onset of each fin system's loss of motion indicates a potential differential sensitivity of CPGs or recruitment of interneurons. Observation of the effects of altered oscillatory motor activity may distinguish modulatory influence of brain interneurons over CPGs from coordinated coupling of multiple CPGs. As dose-dependency and the time frame of anesthetic effects are established, this will provide insight into the function of CPGs in the swim circuit. **(45)**

Colledge, Elissa*, Brittany Smith, Rachel Bilka, and **Edward P. Levri.** Penn State Altoona, Altoona, PA 16601. *The invasive New Zealand mud snail (Potamopyrgus antipodarum) expands its range in streams in the Laurentian Great Lakes watershed.*- The invasive New Zealand mudsnail, is a small freshwater hydrobiid snail with populations in western US rivers and streams and in the Laurentian Great Lakes. The snail has had established populations in the Great Lakes since at least 1991 and in one stream emptying into Lake Ontario since at least 2007. This study's purpose was to broadly survey streams and rivers emptying into Lakes Ontario and Erie to determine the extent of the species lotic invasion in the Eastern US. In the summer of 2011, we sampled over 100 sites from the Niagara River, NY to Oswego, NY on Lake Ontario and over 80 sites from Buffalo, NY to the Pennsylvania-Ohio State line on Lake Erie. At each site, general observations of the stream were made and the organisms living in the stream were surveyed for the presence of New Zealand mud snails. *Potamopyrgus* was found at the site of original discovery and at one additional location. In addition an unusual snail was discovered that turned out to be a hybrid between a native species (*Pleurocera ldjfs*) and an invasive (*Pleurocera virginiata*). This hybrid was extremely abundant in several locations and may qualify as invasive. **(158)**

Corby, Christen* and **Lawrence Quarino.** Cedar Crest College, Allentown, PA 18104. *Analyzing the Halo Effect: Factors Involved in Sequencing the Deposition of Overlapping Bloodstains Caused by Transfer and Airborne Droplets*- Sequencing the order of overlapping bloodstains is an area of crime scene reconstruction that is often overlooked in current evaluation methods. This study examined the patterns observed when contact and airborne droplet bloodstains overlap and how variables such as blood volume and substrate affect such patterns. After the base stain dried, the top stain was added and upon drying of the top stain, the resulting pattern was examined. This research revealed that a red halo of blood was produced around droplets when contact stains were transferred over the blood droplets. This feature was consistently found when droplets were made on several nonabsorbent, smooth substrates with volumes of blood ranging from 5-100µL. Additionally, a substrate-colored halo was produced around the droplets when droplets were placed on top of contact stains on several smooth, nonabsorbent substrates. The feature was most consistently found when the volume of the contact stain was large (50 or 100µL) and the droplet volume ranged from 10-100µL. This research shows a potentially useful technique for helping to determine the order of deposition of overlapping contact and airborne droplet bloodstains and the conditions under which the formation of useful scientific crime scene data can be observed. **(203)**

Coxe, Robert*. Delaware Division of Fish and Wildlife, Natural Heritage and Endangered Species Program, Smyrna, DE 19977. *Delaware's Vanishing North Atlantic High Salt Marsh; where is it going and how much?*–Delaware's North Atlantic High Salt Marsh, which is dominated by salt meadow hay (*Spartina patens*), has been decreasing in acreage since 1937 presumably due to sea level rise. Marsh communities in the wildlife areas and state parks of Delaware were interpreted and mapped using historic imagery from 1937, 1954, 1997 depending on location and recent imagery 2002 to 2007, as part of a larger effort to map the vegetation communities of managed areas. The resulting maps were then compared as to acreage, location, and change from the respective time periods. Field observations were made to ground truth the more recent mapping and changes. Using the above comparisons, North Atlantic High Salt Marsh has lost 25 acres collectively in the wildlife areas and state parks surveyed thus far in the 2002 to 2007 time period and at least 615 acres since 1937. Assawoman Wildlife Area has lost 28 acres since 2002 giving it the most losses of any area. Little

Creek Wildlife Area, through reed grass (*Phragmites australis*) control efforts, has gained 38 acres since 2002. Most of the North Atlantic High Salt Marsh lost has converted to North Atlantic Low Salt Marsh, Reed Tidal Marsh, or water. **(138)**

Cross*, Trevor, Deborah Moran, Melinda Harrison, and **David Dunbar.** Cabrini College, Radnor, PA 19087. *A genomic and proteomic analysis of myoviradae mycobacteriophages* - Mycobacteriophage are a group of viruses that infect mycobacterial hosts such as *Mycobacterium tuberculosis* and *Mycobacterium smegmatis.* Over the last several years, close to 200 of the almost two thousand phages discovered have been analyzed at the genomic level and have been shown to be replete with novel genes, most with unknown functions. 21 of these mycobacteriophages discovered have rather short, contractile tails and therefore belong in the family myoviradae. Proteomics work is currently being conducted with several mycobacteriophage that are in the myoviradae family to identify the structural proteins. Of particular interest will be the identification of the minor tail proteins of mature phage particles since these proteins allow the phage to bind to host cells prior to an infection cycle. Identification of these virion structural proteins should give us greater insight into how to use mycbacteriophage phages in phage therapy applications for the cure of antibiotic resistant tuberculosis. **(189)**

Curtin, Alexander P. * and **Rob J. Kulathinal.** Temple University, Philadelphia, PA 19122. *Using comparative genomics to identify compensatory mutations in human disease-related proteins* - Intramolecular compensatory mutations at amino acid sites mask deleterious effects by preserving the protein's overall structure and function. Using the *Online Mendelian Inheritance in Man* (OMIM) database, we created a mySQL database linking 1,435 disease phenotypes to 4,934 single amino acid changes. Corresponding disease-related genotypes to human protein isoforms found in *Ensembl* and *Swissprot*. Finally, we compared human amino acid mutations to their orthologous amino acid site in other species. If the same mutation occurs in both the human and the orthologous proteins, further characterization of differences in protein structure was conducted to elucidate the structural effects of mutation. By analyzing compensatory mutations based on their position relative to the diseased mutation, both within the context of the primary structure of the peptide sequence as well as its tertiary structure, we hope to better understand the likelihood of mutations having deleterious effects within varying intramolecular contexts. **(98)**

Cusick,*Corinne E. and **Carolyn F. Mathur.** York College of Pennsylvania, York, PA 17403. *The Nasal Carriage Rate of Staphylococcus aureus Among College Students: 2007-2011* - The Gram-positive bacterium *Staphylococcus aureus* (SA) has been widely implicated in both nosocomial and community-acquired infections. In this study, the nasal carriage rate was measured in college students from 2007 through 2011 in both the fall and spring semesters. Nasal swabs were cultured in staphylococcus enrichment broth, and SA detected by positive mannitol salt agar and coagulase tests. Overall, 172/634 (27%) were SA positive. This SA community nasal carriage rate is comparable to that reported in other studies. Using a Fisher exact two-tailed test, no significant differences were detected when comparing years (p=0.8930), season (p= 0.4247), employment in healthcare (p=0.3616), and gym participation (p=0.1258). However, males did have a significantly higher nasal carriage rate than females (p=0.03). A sub-sample of these (n=532) was also tested for the antibiotic resistance enzyme, β-lactamase, and 12.97% of these were both SA and β-lactamase positive. This study is ongoing to further understand any factors that may be relevant to the nasal carriage rate of antibiotic-resistant SA in the college community. **(84)**

Cutaiar, Gabrielle*, Kirsten Nole and **André Walther**. Cedar Crest College, Allentown, PA 18104. *Replication Protein A Phosphorylation Regulates Nucleotide Excision Repair and May Regulate Physical Interactions with Repair Proteins in Saccharomyces cerevisiae* – Xeroderma Pigmentosum (XP), a human autosomal recessive disease associated with a predisposition to cancer, is caused by mutations in the Nucleotide Excision Repair (NER) pathway that is responsible for repairing UV damage to DNA. An important player in NER is Replication Protein A (RPA), which physically interacts with a number of repair proteins and is phosphorylated in response to UV irradiation, suggesting a role in NER regulation. The NER pathway is highly conserved between humans and the budding yeast *Saccharomyces cerevisiae*. In order to test the role of RPA phosphorylation in NER, we constructed yeast strains containing variants of RPA that mimic either constitutive phosphorylation or dephosphorylation, and measured cell viability of these mutants in the presence of UV damage. Constitutive phosphorylation of RPA led to decreased viability in the presence of UV. We then combined RPA phosphorylation mutations with all known NER genes to identify genetic interactions within the NER pathway. Complex genetic interactions between RPA and multiple NER genes were identified, indicating that phosphorylation of RPA plays a role in regulating NER in yeast. We have recently begun to examine how RPA phosphorylation affects physical interactions with a number of proteins involved in multiple repair pathways. **(29)**

Dechene, Robyn * and **John A. Cigliano.** Cedar Crest College, Allentown, PA 18104. *The Effect of Diet on the Survival and Reproduction of the Brown Marmorated Stinkbug, Halyomorpha halys* - *Halyomorpha halys*, the brown marmorated stinkbug, has become an agricultural pest in the United States. However, little is known about its ecology in its non-native habitats. Laboratory experiments were conducted to determine how various diets affect the survival and fecundity of *H. halys*. *H. halys* is known to feed on different plant species, however, it is not well-known if it can survive and reproduce

on them. Diets consisted of a control: green beans (*Phaseolus vulgaris*), sunflower seeds (*Helianthus annuus*), and carrots (*Daucus carota*), and three treatments: apple (*Malus spp.*), raspberry (*Rubus idaeus*), and philodendron (*Epipremnum aureum*). Diets were chosen because *H. halys* had been observed feeding on them. Survival and fecundity rates varied between the four diets. Preliminary analysis indicates that *H. halys* survived best on the control and apple diets. Survival was lowest on the philodendron. Reproduction and instar development occurred on all diets except philodendron. The results indicate that economically important crops can be used as a primary host by *H. halys*, i.e., used for feeding, egg-laying, and instar-development. This has significant implications for the growth and spread of *H. halys* and because feeding by *H. halys* can cause significant damage to fruits. **(170)**

DeHart, Kyle*, George Meindl, Dan Bain, and **Tia-Lynn Ashman.** University of Pittsburgh, Pittsburgh PA 15260. *Local Adaptation on California Serpentine Sites: Assessing the Effects of Evolutionary History on Serpentine Plant Species*– Serpentine soils present a generally stressful growing environment for plants due to a number of edaphic factors, including a low Ca/Mg ratio and high concentrations of several heavy metals (Co, Cr, Ni). Plants found on serpentine soils display a gradient of adaptation to serpentine, ranging from weakly tolerant to strictly endemic. The degree to which soil chemistry alters plant tissue chemistry likely varies by species, yet we currently have no clear data as to whether evolutionary history (i.e., prior exposure and adaptation) plays a significant role in determining plant chemical uptake from soils. In this study we tested whether evolutionary history could predict the relationship between soil chemistry and plant tissue chemistry. Flowers, shoots, and seeds from six plant species were collected from five serpentine outcrops in the McLaughlin Nature Reserve, Lower Lake, CA. The study species represented three confamilial pairs (*Scrophulariaceae*, *Fabaceae*, and *Ranunculaceae*) with each pair consisting of one serpentine endemic and one serpentine tolerant species. Tissue was microwave digested and element concentration was quantified using ICP-MS. We predicted that endemic plant species would more effectively exclude deleterious elements present in serpentine soils (e.g., Ni, Co, Cr and Mg) relative to tolerant plant species. **(184)**

Delis, Alexander*, Brad Armen, and **Pablo R. Delis.** Shippensburg University, Shippensburg, Pennsylvania 17257. *A New Apparatus for Measuring Plastral Adduction Forces in the Eastern Box Turtle (Terrapene c. carolina L.)* -The Eastern Box Turtle, *Terrapene c. carolina*, is one of the few turtles in the world capable of completely retracting its soft body parts within the confines of its shell. This turtle possesses a very domed carapace, hinged plastron, and a series of thoracic and abdominal muscles acting together in a pivoting motion like a lever system. We built an apparatus to measure the force produced by the Eastern Box Turtle when adducting the plastral elements. The apparatus consists of three basic mechanical and electrical elements: (1) a mechanical component involving two levered rods that can be inserted between carapace and plastron, (2) a commercial load cell, which converts the force exerted between the rods into an electrical signal and (3) an electronic module which processes the load cell's signal, providing a calibrated reading of the maximum plastral force encountered. The apparatus is capable of measuring a maximum of about 25 kg of force (KgF) with a precision of 0.01 KgF and an accuracy of near 3%. So far, this apparatus has proven effective in field trials, and we anticipate that future data collected will help us study the plastral biomechanics in the Eastern Box Turtle. **(111)**

Delle Donne, Nicole* and **Thomas A. Brettell.** Cedar Crest College, Allentown, PA 18104. *Preliminary Studies of the Effect of Blood Alcohol Concentration on the Calculation of the Impact Angle in Bloodstain Pattern Analysis* **-** Bloodstain pattern analysis (BPA) can provide crime scene investigators with important information aiding in the reconstruction of a crime. This research focused on the effects of ethyl alcohol on BPA. A buret filled with defibrinated sheep blood was used to control the volume of drops onto a glass substrate at a given impact angle. Photographs were taken of bloodstains on the substrate and the length and width of each bloodstain was measured using Photoshop®. The mean impact angle was calculated from the measured values. The measurement deviation of a bloodstain was explored when pure ethyl alcohol is added in-vitro to the blood. The results indicate 0.05% (w/v) ethanol in the blood may cause a decrease in the impact angle when measured at 50°. No significant change in the impact angle could be detected at 90° due to a relative high standard deviation in measurement. Further research must be performed to confirm the observations in this study. This work offers some preliminary insight into whether ethanol plays a significant role in the possible misinterpretation of bloodstain evidence. **(76)**

Dickinson, Courtney* and **Cynthia Keler.** Delaware Valley College, Doylestown, PA 18901. *The Effect of Plant Growth Promoting Bacteria on Lettuce Grown in Varying Salt Concentrations.* The purpose of this experiment was to discover if plant growth promoting bacterium (PGPR) aid three types of lettuce in dealing with the added stress of differing salt concentrations. Red Romaine, Waldmann's Dark Green Lettuce and Black Seeded Simpson were grown and once they were large enough in size the soil will be inoculated with *Pseudomonas baetica, Enterobacter nimipressoralis, Microbacterium arborenscens* or *Agrobacterium radiobacter. E. coli* was used as a control group as well as a group of plants that did not receive any bacteria. All of the experimental set of plants had a bacterium that was shown to promote plant growth during the fall 2010 semester in Microbiology lab at Delaware Valley College. The salt percentages used were

0%. 0.5% and 2% (0mM, 10mM and 50mM). The health of the plant was observed and the above ground mass were measured to determine if the bacteria assisted the plants better survive in the varying salinity. This experiment simulates naturally occurring soil with high salinity levels. **(88)**

Diegelman-Parente, Amy*. Mercyhurst College, Mercyhurst, PA 16546. *An Elusive Quest for Food Additives in the Environment* – The list of ingredients on the back of our food products are becoming longer as more chemicals are included to make these commercial products calorie-free, long-lasting, brightly colored, and full of flavor. Many of these substances are not metabolized in our bodies, which for some allows them to be calorie-free and for most allows them to be generally recognized as safe (a.k.a GRAS) for human consumption by the FDA. However, these attributes generally mean these water-soluble substances exit our body largely unmodified in structure. While this is advantageous for the commercial food industry, the accumulation of some of these substances in the environment is increasing at an alarming rate. This research project examines one such substance, sucralose (commercially known as Splenda), which is accumulating to a such a significant extent in our natural aquifers that it is now considered an anthropogenic tracer for wastewater contamination. This project aims to utilize both chemical and immunological detection methods to selectively and sensitively identify sucralose in both artificial (prepared standards) and natural (local environmental) samples. **(196)**

Diegelman-Parente, Amy and **Ashley E. Westgate.*** Mercyhurst College, Mercyhurst, PA 16546. *Chemical Detection Methods for the Artificial Sweetener Sucralose in the Environment* – The chemical sucralose, commercially known as Splenda, boasts that it is "made from sugar, so it tastes like sugar." Indeed, there are many things that are similar structurally between sucralose and sucrose (table sugar). Both have high water solubility, low volatility, but limited spectroscopic visibility, meaning there are not currently simple methods for selective and sensitive detection of this analyte. Of significance, sucrose is broken down into normal products of metabolism (carbon dioxide and water), while sucralose exits the body largely unmodified (only 5% of sucralose is modified metabolically). As there are also no natural routes for its breakdown in the environment, significant levels of sucralose are now appearing in our natural water systems. Measurements of sucralose in wastewater influent have been reported at almost 3 μg/L in the U.S., providing strong evidence for the environmental accumulation of this food additive. This project aims to identify suitable chemical detection methods to selectively and sensitively identify sucralose in both artificial (prepared standards) and natural (local environmental) samples. Of great interest is the use of a methodology that will allow for the direct analysis of aqueous samples without the need for extensive sample preparation or derivitization. **(101)**

Diegelman-Parente, Amy and **Gregg Robbins-Welty.*** Mercyhurst College, Mercyhurst, PA 16546. *Design of a Biological Sensor for ATP using a DNA Aptamer and Calorimetry* – ATP is one of the most important molecules in our body. In addition to serving as one of the main building blocks for our genetic blueprint, ATP transports chemical energy from metabolic processes and serves as an important chemical messenger in cellular signaling. Aptamers are DNA or RNA sequences that fold into a shape allowing for binding to a small molecule of interest. A DNA aptamer has been identified whose sequence allows it to fold into a structure that binds ATP with high affinity (6 μM). By introduction of a competing folded structure, the binding constant can be shifted into a more physiologically relevant range. Calorimetry incorporates a set of physical techniques that can be used to measure the thermodynamic parameters of molecular interactions as well as investigate the effects that ligand-binding can have on stability of the DNA molecules. These techniques provide a more complete picture of the ways in which alternative secondary structure formation can be used to tune the affinity of RNA and DNA sensors of small molecules. This project aims to use these calorimetric methods to characterize a DNA aptamer that binds ATP in a desirable physiological range (1 – 10 mM). **(102)**

Diegelman-Parente, Amy and **Nicole E. Frederickson.*** Mercyhurst College, Mercyhurst, PA 16546. *Immunological Detection Methods for the Artificial Sweetener Sucralose in the Environment* – Sucralose (better known as Splenda) is an artificial sweetener present in many low-calorie food products. It is non-caloric because our body is unable to metabolize this modified disaccharide. While this is beneficial from a dietary standpoint, what this means for any compound that is not broken down in the body is that it exits the body with the same chemical structure as it entered. Since sucralose is very water-soluble and there are no natural routes for its degradation, significant levels of sucralose are now appearing in our natural water systems. The ability to detect and monitor levels of sucralose is thus important to maintaining the integrity of our water supplies. Sucralose, with a structure very similar to sugar, is not easily detected by most basic spectroscopic detection methods (i.e. UV-Vis spectroscopy, GC-MS). This project aims to develop immunological detection methods that can be used to selectively and sensitively identify sucralose in both artificial (prepared standards) and natural (local environmental) samples. These methods are being developed in collaboration with Rockland Immunochemicals, and will generate antibodies for sucralose that will be incorporated into an ELISA assay that should have greater selectivity and sensitivity than any current chemical detection methods. **(100)**

Doscher, Briana*, M. Dana Harriger, Brad E. Engle and **Catherine T. Santai.** Wilson College, Chambersburg, PA 17201. *Effect of High Folic Acid Serum Concentration Through Diet Fortification and Supplementation on the Development of Rats*. Supplementation and fortification with folic acid (vitamin B9) before conception decreases incidence of neurological birth defects. U.S. grains are fortified with folic acid. Surveys indicate 5% of the population consumes folic acid above upper intake levels (1000µg). However, effects of high serum levels of folic acid through fortified diets or supplementation on development is not widely known. Studies have shown that high concentrations of folic acid in the diet can cause developmental defects. This study investigated if *in utero* exposure to high concentrations of folic acid through diet and supplementation contributes to developmental and cardiac anomalies. Female SAS-SD rats were bred and maintained on their prescribed diet regimen throughout the pregnancy. Dams received folic acid at varying concentrations for six weeks prior to and throughout pregnancy. The control group received a normal 3mg/kg, supplemented group 20mg/kg via oral gavage, fortified diet group 20mg/kg, and the combination which received both for 40mg/kg. Dams were mated and the pups were analyzed at 9-11 days post-partum. Hearts were digitized and a comparative morphometric analysis where wall thickness of ventricles, septum, and aorta were measured. Results of this study may be indicative of abnormalities associated with fortification of folic acid in diets during pregnancy. **(74)**

Drab, Diana L.,* and **Eric P. Ingersoll.** Penn State Abington, Abington, PA 19001. *Expression of Aminopeptidase N Genes During Sea Urchin Development*. – Aminopeptidase N (APN) is an exopeptidase that has been shown to play a role in the development of nematodes and fruit files. Recent advances in genome sequencing have made available information allowing the identification of genes in the sea urchin genome. We have searched the sea urchin genome and found a number of APN genes. In this study, we are determining which of these APN genes is expressed during embryonic development. We used reverse transcription PCR to detect gene-specific mRNAs throughout development. Our studies have identified two APN genes that are expressed in embryos. We will present data on the temporal expression of these genes throughout the entirety of sea urchin embryonic development. In the future, we hope to determine the spatial expression patterns and developmental functions of these genes. **(60)**

Enterline, Rebecca *, Brianna Lutz*, and **David Broussard.** Lycoming College, Williamsport, PA 17701. *The Effects of Sleep Deprivation on Sympathetic Nervous System Output During Induced Mental Stress*- Sympathetic nervous system output causes elevated heart rate, sweat production, and increase in blood pressure in response to mental and physical stress. Sleep deprivation can alter individual stress response by altering circadian patterns of hormone secretions such as cortisol. We utilized a simple Stroop color word test to induce a state of mental stress in sleep-deprived (≥8 hours of sleep per day) and non-sleep deprived individuals (≤ 8 hours of sleep per day) to study the impact of sleep deprivation on stress response. Using Galvanic Skin Response (GSR) and elements ECG's, the stress responses of 104 college students was measured and analyzed. Sleep-deprived students had significantly higher heart rates during mental stress compared to non-sleep deprived students. However, non-sleep deprived students showed a greater increase in both GSR and P-wave amplitude of the ECG compared to sleep-deprived students. Our results indicate that response to mental stress can differ based on individual differences in amount of sleep. **(115)**

Ernst, Nicholas* and **Terry Master.** East Stroudsburg University, East Stroudsburg, PA 18301. *The Louisiana Waterthrush as a Bioindicator of Hemlock Habitat Productivity: a Comparison of Hemlock Ravines and Benches* –Stands of Eastern Hemlock (*Tsuga canadensis*) are found along two specific types of headwater streams, those flowing swiftly through narrow valleys (ravines) with steep gradients and those meandering slowly across flat floodplains (benches). All stands are currently declining throughout their range as a result of an introduced insect pest, the Hemlock Woolly Adelgid (*Adelges tsugae*) (HWA). Previous studies indicate the Louisiana Waterthrush (*Parkesia motacilla*) to be a robust bioindicator of headwater stream ecological integrity. To better understand the overall quality of these habitat types, we quantified waterthrush habitat use, foraging rates, and reproductive success, for birds utilizing ravine and bench habitats in northeastern Pennsylvania. Bench habitat provided significantly more surface area ($t= 3.73$, $p < .001$) and a greater diversity of substrate types for foraging waterthrush. Birds occupying benches caught more prey/min ($t= 3.21$, $p < .001$) then their ravine counterparts. While not significant, pairs nested at higher densities on benches and had shorter territory lengths than did ravine pairs. Nest survival however, was higher on ravines than it was on benches. More study is needed to determine which habitat type should receive priority for the application of HWA protection measures. **(121)**

Faivre, Amy E., Stephanie H. Augustine*, Courtney B. Godbolt*, and **Mehveen R. Qureshi*.** Cedar Crest College, Allentown, PA 18104. *Temperature effects on pollen tube growth in flowers of Christmas cactus (Schlumbergera sp.)* - More than 100 varieties of Christmas cacti exist today. Most of them originated from a hybridization of a low elevation and a high elevation species of *Schlumbergera* from Brazil and then subsequent hybridizations. Today Christmas cacti are popular as houseplants worldwide. We studied the effects of temperature on pollen tube growth in out-crossed flowers of one variety of *Schlumbergera*. Previous varieties of Christmas cacti have shown pollen tubes reaching shorter distances within the style when exposed to cooler temperatures. Flowers were emasculated to ensure only out-crossed

pollen was placed on the stigma surface. After hand-pollinations, plants were placed either in an environmental chamber with temperatures that ranged from 9-11.5°C or in a greenhouse with temperatures that ranged from 15-25.5°C. Plants in both locations were exposed to the same range of humidity. At approximately 16 or 24 hours following hand-pollinations flowers were collected and stored in FAA. They were stained with 0.1% aniline blue and observed using fluorescence microscopy. The presence of pollen tubes within the stigma and style was recorded as well as the length of the longest pollen tube in each flower. Comparisons were made between flowers exposed to the two different temperature ranges. **(186)**

Fedorczyk, Lori[1], Brad E. Engle[1], M. Dana Harriger[1], and **Carl F. Larson[2]**. [1]Department of Physical and Life Sciences, [2]Department of Behavioral Sciences, Wilson College, Chambersburg, PA 17201. *Social Reorganization in Female Mice and Its Impact on Hippocampal Function* - Social reorganization with male mice has produced toxic effects after exposure to an influenza virus. Studies to elucidate the mechanism have focused on immunological effects, leaving out the potential neurological impact from repeated activation of the hypothalamic-pituitary-adrenal (HPA) axis. Corticosteroids released during the stress response have a significant impact on the hippocampus, a region of the brain noted for learning and memory. The current study focused on the neurological impact of social disruption in the murine model, C57BL/6J. Groups of female mice were reorganized every other day over three different time frames (1, 2, or 4 weeks). Physiological parameters, hippocampal function (Morris Water Maze), and social behavior (ethogram and grooming) were assessed in comparison to mice left in their home cage. Preliminary data suggest impaired hippocampal function and altered social behavior among socially disrupted groups. Plasma corticosterone levels (ELISA) and hippocampal glucocorticoid receptor concentrations (immunohistofluorescence) are also being evaluated. Extension of the primary research used enrichment activities to examine the possibility of reversing adverse effects over a four week period. Results are expected to contribute to the body of research on the negative impact of social reorganization and potentially suggest a method for mitigating those effects. **(73)**

Ferry, Samantha*, Ana Lemus-Moreno*, Brittany Ray*, and **Erin Wysolmerski.*** Immaculata University, Immaculata, PA 19345. *Comparison of Insect Capture Rates in Two Species of Pitcher Plant (Sarracenia)*-- Two species of pitcher plant*, S. minor* and *S. purpurea* were examined to determine the role of leaf morphology in insect capture success. Both species employ tubular leaves lined with downward pointing hairs to capture insects as part of their carnivorous habit. *S. minor* has long tubular leaves that terminate in a curved hood. Insects gain entrance to the trap through an opening on the underside of the curved hood. *S. purpurea* have tubular leaves, but the trap is open at the top. Our hypothesis is that *S. minor* with the hooded trap would have higher capture success because of the leaf morphology. Individual specimens of both species were placed in 77x 31x48cm chambers into which known numbers of *Drosophila melanogaster* were released. After 48 hours, the number of flies captured was determined. Capture success was calculated as the number of flies found within the trap at the end of the trial expressed as a percentage of flies initially introduced into the chamber. *S. minor* showed on average a 4 times greater capture success than *S. purpurea*. Mean percent capture for *S. minor* = 28.7±4.9 %; *S. purpurea* = 7.0±3.6%. Differences were significant as determined by the student t-test (t= 3.52, P<0.001). **(180)**

Foye, Shane* and **Megan Rothenberger**. Lafayette College, Easton, PA 18042. *Efficacy of Galerucella calmariensis and G. pusilla as biocontrol agents of Lythrum salicaria at Jacobsburg State Park* –Biocontrol is controversial because it involves introduction of another non-native species to remove an invasive species. However, *Galerucella calmariensis* has been used successfully and safely to control its singular food source *Lythrum salicaria* (purple loosestrife), a plant that devastates wetland ecosystems in 49 of the 50 United States. While numerous studies have been done regarding the mass release of *G. calmariensis* beetles, none report quantitative post-release information that could improve loosestrife management. The objective of this study was to quantify the impact of two biocontrol agents, *Galerucella calmariensis* and *Galerucella pusilla*, on growth of *L. salicaria* within field enclosures (i.e., six experimental each with 60 beetles and six control cages without beetles). The proportion of leaves discolored and damaged by predation and the proportion of destroyed flower spikes were determined on a weekly basis over a two-month period. In just two months after their introduction, biocontrol beetles completely defoliated ~50% of total stalks. Beetle cages had significantly more damaged and discolored leaves compared to control cages. This study indicates that *Galerucella* beetles can reduce stem height and leaf productivity significantly over one season and that biocontrol beetles may be capable of managing loosestrife outbreaks in a more eco-friendly way than herbicides, albiet at a slower pace. **(132)**

Frantz, Brian*, **Matthew Rimbey***, and **Jane Cavender**. Elizabethtown College, Elizabethtown, PA 17022. *Mapping of the SV40 T antigen binding domain to TBP in vivo* - SV 40 T antigen (T-ag), a viral oncoprotein, is sufficient for transformation of mammalian cells in culture and can form tumors in animal models. T-ag has been shown to interact with the TA-TA-binding protein (TBP) to transactivate genes containing RNA Pol I, II, and III-dependent promoters. The T:TBP binding site has been mapped to amino acids T5-172 and T133-249 in *in vitro* GST-T-ag fusion protein studies. Our lab, has recently mapped the Pab 416 antibody epitope to residues 94 and 98 of T-ag and this study has been designed to determine if these residues are critical for the TBP:T-ag binding. To assess the binding *in vivo*, COS-1 (simian), 293T (human), and

WT-19 (murine) cells, which all endogenously express wild type T-ag, were used for co-immunoprecipitation assays. To date we have found that full length T-ag is unable to immunoprecipitate TBP. To address this discrepancy, we have hypothesized that there may be conformational alterations in the fragments, or inhibitory post-secondary modification. To investigate the former, cell lines expressing N-terminal T-ag fragments T1-121, T1-250 and T1-138 are being analyzed for their ability to co-precipitate TBP. If binding occurs then this suggests a role for the 17K-T, independent of the full length protein. **(14)**

Fredericks, Lawrence[1]*, Terry Weller[1]*, Stephanie Hoppes[1]*, William Blakely[1]*, Matthew Junker[1], and **Carsten Sanders[2].** [1]Kutztown University, Kutztown, PA 19530; [2]University of Pennsylvania, Philadelphia, PA 19104; *Developing an in vitro system for determining the biochemical mechanism of apoptosis regulation by human holocytochrome c synthetase* - Programmed cell death or apoptosis can be induced by various mitochondrial proteins when they are released into the cytosol. Holocytochrome *c* synthetase (HCCS), an essential component of the mitochondrial cytochrome *c* biogenesis system, has recently been implicated to diminish the cytosolic activity of the inhibitor of apoptosis protein (IAP), which keeps a group of pro-apoptotic cysteine proteases (caspases) de-activated. The cytosolic effect of HCCS on IAP may result in caspase activation and hence apoptosis. Using proteins expressed in *Escherichia coli*, we found that the human HCCS homolog cytochrome *c* heme lyase from *Saccharomyces cerevisiae* (CCHL) binds to and coelutes with a human IAP in an affinity chromatography assay. We are progressing to a recombinant system composed entirely of human proteins. Genes for human HCCS, cytochrome *c*, and caspase-3 are being subcloned into appropriate expression vectors for protein production in *Escherichia coli* and subsequent purification to test for interaction between human HCCS and IAP. The functionality of this interaction will then be examined using a fluorimetric caspase assay with the recombinant human caspase-3. **(49)**

Funk, Amber* and **John A. Cigliano.** Cedar Crest College**,** Allentown, PA 18104. *The Effect of Multiple Stressors, Increased Temperature and Acidification, on the Growth and Survival of the Common Periwinkle, Littorina littorea* - The increase in atmospheric CO_2 concentrations from the burning of fossil fuels is not only causing climate change; it is also affecting the ocean by reducing ocean pH (ocean acidification). Average ocean pH could decline from the current pH of 8.2 to a pH of 7.7. Recent studies have shown that the lower pH of the oceans can affect the growth and survival of organisms, especially those that form shells, and other structures, from calcium carbonate. Additionally, recent studies have shown that increased sea surface temperature from climate change can also affect growth and survival. The purpose of this study is to determine the effect of both stressors on the growth and survival of marine organisms using the common periwinkle, *Littorina littorea*. *L. littorea* is a temperate snail that is common along the rocky-coasts of North American, making it an ideal model to test the effects of temperature and acidification on growth and survival. Snails are being exposed to four treatments: control, increased temperature (24˚C), decreased pH (7.7) from increased CO_2 concentration, and decreased pH / increased temperature. We predict that temperature and acidification will have a synergistic, negative effect on growth and survival. **(163)**

Gau, Yael*, Winnie Okwaare*, Caleb Smith, Michael Myett, Alyssa C. Bumbaugh and **Lucinda H. Elliott.** Shippensburg University, Shippensburg, PA 17257. *Elucidating the role of Atg5 and autophagy in clearance of Shigella flexneri, from infected cells*. The results of this study are part of a continuing project to determine the significance of autophagy, in clearance of the intracellular pathogen, *Shigella flexneri*, in infected glioma cells. Autophagy is a cellular housekeeping process used at basal levels to recycle old organelles and long-lived cytosolic proteins, but is also induced during times of stress such as nutrient deprivation. Autophagy also functions as an alternative mechanism to target intracellular parasites for immune clearance. Recent evidence suggests that some intracellular pathogens, including *Shigella*, have evolved mechanisms to subvert autophagy for bacterial growth and survival. In this study, SNB19 cells, which are deficient in autophagy because they lack a critical regulatory protein, Atg 5, were compared to a cell line, SNB19/Atg5, which is stably transfected with an expression vector for EGFP/Atg5. Preliminary infection and killing assays were inconclusive because less than 25% of the transfected cells overexpressed EGFP/Atg5. The stably transfected cell line was subcloned by limiting dilution in an attempt to obtain a pure clone of EGFP/Atg5 overexpressing cells. In addition, SNB19 cells were transiently transfected and selected to generate an enriched population of cells over-expressing EGFP/Atg5. Infection and killing assays were repeated with the clones enriched for overexpression of EGFP/Atg5. **(21)**

George, Gregory A., Melissa Gallo*, and **Katie Rittenhouse**. Delaware Valley College, Doylestown, PA 18901. *Prey Selection of Wintering Long-Earred Owls (Asio otus)*-- Foraging ecology is an important component to understand species' resource requirements. Quantifying foraging ecology of nocturnal species can be difficult. Owl pellet analysis allows for indirect quantification of foraging preferences. Over 100 Long-eared Owl (*Asio otus*) pellets were collected and analyzed from a communal roost site in Bucks County, Pennsylvania. Pellets were collected during the winters of 2011 and 2012. Osteological features were used to identify prey species. To gently remove the integumentary material, the pellet was boiled in a 3% solution of sodium hydroxide

(NaOH). Meadow voles (*Microtus Pennsylvanicus*) were common among prey items selected as has been documented by other studies. *Microtus* voles, irrespective of species, are often associated with the diet of Long-eared Owls throughout their range. **(123)**

Gingrich, Stephanie* and **Diane Bridge.** Elizabethtown College, Elizabethtown, PA 17022. *Is FoxO expressed in interstitial stem cells in Hydra vulgaris*? In vertebrates, *Drosophila*, and *C. elegans*, FoxO transcription factors have been implicated in the regulation of aging, as well as in cellular stress responses, cell metabolism, and cell cycle control. Existing data suggest that aging does not occur in the simple invertebrate *Hydra vulgaris*. The multipotent interstitial stem cells of *Hydra* give rise to neurons and gametes as well as to stinging cells and secretory cells. Whole mount in situ hybridization suggests that *Hydra* FoxO may be expressed at high levels in the interstitial stem cells. To determine whether FoxO is expressed in interstitial stem cells, in differentiating cells derived from these stem cells, or in both, we have experimentally reduced numbers of interstitial stem cells and then performed two-color in situ hybridization using probes for FoxO and for a gene expressed in early stages of differentiation in interstitial lineage cells. **(18)**

Godfrey, Jordon *, Kevin Bloh, and **Jane F. Cavender**. Elizabethtown College, Elizabethtown, PA 17022. *The Effects of SV 40 Large Tumor Antigen Expression on 3T3-L1 Pre-Adipocyte Cell Differentiation* -SV40 large tumor antigen (T-ag) is a 708 amino acid oncoprotein commonly used in cell line immortalization and for the study of tumorigenesis. Additionally, T-ag has been shown to block the differentiation of murine 3T3-L1 preadipocytes into mature fat cells. Previous studies show that the T-ag binding of the retinoblastoma gene product (pRb) is essential for the blockage of differentiation. pRb is essential for the activation of the C/EBP transcription factors. Interestingly, full length T-ag mutants that are incapable of binding pRb are still able to block differentiation; thus, indicating a second, undefined activity. This study was designed to map this unknown function and determine additional host proteins in the adipogenesis pathway that are targeted by T-ag. To accomplish this we have created 3T3-L1 cell lines expressing full length T1-708, N-terminally truncated T251-708, and several Rb-, p53-binding deficient T-ag double mutants. Currently, T-ag expression is being confirmed through PCR, immunoflourescence, and western blot analysis. Differentiation assays will then be performed and the cells will be assessed for fatty acid accumulation by Oil Red-O staining. Our goal is to use T-ag mutants with known functions ascribed to them, to narrow the possible activities of the protein involved in dis-regulating adipogenesis. **(15)**

Goodrich, Laurie*, Jeremy Scheivert, and **Denise Peters.** Hawk Mountain Sanctuary Association, Kempton, PA 19529. *Learning on the Mountain: Hawk Mountain Conservation Education Activities, Opportunities, and Internships* – Hawk Mountain, a non-profit wildlife conservation organization, was established in 1934 and hosts more than 70, 000 visitors' annually including 15,000 school children. The sanctuary contains eight miles of trails that traverse 2500 acres of upland forest and breath-taking vistas. Education programs are conducted year-round for visitors with school groups visiting primarily during spring and autumn. A teacher's guide and other classroom materials are provided on the web to enhance in-class learning. New programs and materials are being developed using raptor migration counts and telemetry data. Twelve interns are trained each year in conservation science and monitoring. In 2011, Hawk Mountain launched a new opportunity for undergraduate students seeking experience or training in environmental education with a part-time conservation education internship option. Education interns participate in a breadth of activities learning about the natural history of Appalachian forest, and raptor biology and migration science, Interns gain experience in public speaking, developing education programs, and interpretive techniques. Interns work closely with staff, and credit and independent study opportunities are available. Other part-time internship options include environmental management, communications, and computer science. Timing of internships is flexible although spring and autumn may provide the best individual experience. **(79)**

Gordon, Matthew[1*], Kenneth Anderson[2], and **Andrew Turner[1].** [1]Clarion University, Clarion, PA 16214; [2]Pennsylvania Fish and Boat Commission, Tionesta, Pennsylvania. *Brook Trout reproductive success and roadside-based passive treatment systems: crab shell chitin in the limelight*. This study evaluated the relative effectiveness of three alkalinity addition methodologies in improving brook trout spawning success in acid-rain degraded headwater streams. Three headwater streams were experimentally manipulated with the addition of alkaline material to the watershed, with each stream treated in a different manner, and two streams remained as unmanipulated controls. The three treatment methodologies consisted of 1) covering streamside roads with limestone driving surface aggregate (DSA), 2) DSA addition plus the construction of a drain filled with finely crushed limestone, and 3) DSA addition plus the construction of a drain filled with crab shell chitin. Stream chemistry, measured before and after construction of treatment systems near treatment loci, showed the greatest improvements from the treatment system containing crab shell chitin. Improvements in water chemistry did not translate into increased brook trout spawning success farther downstream. Stream pH and alkalinity profiles conducted during fall 2011 and spring 2012 show that treatment effect does not persist farther downstream into

brook trout spawning areas. This study highlights the need to consider flow rates, percent of watershed treated, dosing, and longevity when considering the use of roadside-based passive treatment systems to recover native brook trout populations. **(63)**

Gray, Alicia,* Lauren McKean,* and **Amy J. Reese.** Cedar Crest College, Allentown PA 18104. *Interaction of Cell and Capsule in Rhodotorula Fungal Species* - Fungi are all around us. While some are helpful, such as those involved in decomposition, others are responsible for infections, including fungi that cause mild issues like athlete's foot and those that cause severe medical conditions and affect immunocompromised individuals. *Cryptococcus* and *Rhodotorula* species are yeast-like fungi that cause these opportunistic infections. The key virulence factor of *Cryptococcus* is its polysaccharide capsule that is bound to cell wall alpha-1,3 glucan. A polysaccharide capsule is also present in *Rhodotorula*, but it is unknown how it is attached to the cell and how it affects the cell's virulence. We hypothesize that the cell wall and capsule interaction in *Rhodotorula* is also mediated by alpha-1,3-glucan and are using *Cryptococcus* as a capsule-binding model. To investigate the cell-capsule interaction, we are using capsule material shed from normal strains as a source of capsule and acapsular strains (that do not produce capsule) of each fungus as the acceptors. To evaluate if the cells can bind the opposite strain's capsule, fluorescently tagged antibodies were used to detect if capsule material was bound. We found that acapsular *Cryptococcus* was able to bind *Rhodotorula* capsule material and vice versa, suggesting the fungi bind capsule in a similar manner. **(86)**

Hallowell, Benjamin*, Elizabeth Miller, and **Lawrence Mylin.** Messiah College, Grantham, PA 17027. *CD4+ T Lymphocyte Induction by a Mouse Polyomavirus Epitope inserted into the Simian Virus 40 Large Tumor Antigen (SV40 T ag)* – Our laboratory has used the SV40 T ag as a model tumor antigen to study CD8+ T cell-dependent control SV40 T ag-induced tumors in mice. We wish to explore the role of SV40 T ag-specific CD4+ T cells in establishing and maintaining tumor control and in regulating tumor-induced (CD8+) T cell tolerance. Residues 529-543 have been identified as a CD4 T cell epitope within the SV40 T ag which appears to be weakly immunogenic in C57Bl/6 mice immunized with SV40 T ag-expressing cells. To explore factors which may limit the immunogenicity of LT529-543 within SV40 T ag, we have constructed SV40 T ag derivatives in which LT529-543 was replaced by amino acids corresponding a related murine Polyomavirus Large T antigen (mPyT) LT678-690 epitope. Immortalized cell lines were generated by transfection of primary C57Bl/6 kidney cells, and have been compared in immunization experiments to CD4+ T cell induction by established cell lines which express the unaltered SV40 T ag. These and experiments in which the immunogenicities of synthetic peptides corresponding to the respective epitopes were compared will allow us to determine whether location within the SV40 T ag or intrinsic properties limit the immunogenicity of the SV40 T ag LT529-543 epitope. **(200)**

Haneschlager, Lisa* and **Jessica Nolan**. York College of Pennsylvania. York, PA 17403. *Distribution and Population Size of Aquatic, Basking Turtles in Lake Marburg (Hanover, PA).*- Red-bellied turtles (*Pseudemys rubriventris*), painted turtles (*Chrysemys picta*) and red-eared sliders (*Trachemys scripta elegans)* are all found within Lake Marburg (Hanover, PA), however, their populations have not been well-studied. Red-bellied turtles are listed on the Pennsylvania threatened species list as their populations have declined due to factors such as habitat loss and pollution. The objective of this research was to use mark-recapture methods to estimate population size and distribution of all three aquatic turtles in the lake, especially during mating or nesting season. Basking traps and/or baited traps were introduced to selected locations between May and September 2009, 2010 and 2011. Population sizes were estimated to be 38 for red-bellied turtles (95% confidence intervals: 7-745), 164 for painted turtles (95% confidence intervals: 136-204) and 217 for red-eared sliders (95% confidence intervals: 65-1222). Red-bellied turtles were captured more frequently at Chapel Cove and they were also observed mating more frequently at Chapel Cove and Marburg Flats. The results of the study give insight into the turtles' preferences for location and allow for better understanding of the aquatic turtle populations found in Lake Marburg. **(176)**

Hanna, Gousfin.*, Christa Filipkowski*, Amy Wascavage* and **Kenneth M. Klemow.** Wilkes University, Wilkes-Barre, PA 18766**.** *Inhibition of Woody Colonization on a Reclaimed Anthracite Mine: Role of Seed Germination and Seedling Survival* – Since the 1970s, surface coal mines have been reclaimed using a methodology that focuses on establishing a ground cover of non-native grasses and legumes on a compacted surface. While such sites are expected to succeed into native hardwood forest, tree colonization of such sites has proven to be limited. In order to understand the factors limiting tree colonization and establishment, a series of studies has been conducted on a reclaimed anthracite mine site southwest of Wilkes-Barre. Initial findings have suggested that colonization is limited by the inability of hardwood tree seeds to colonize the site. To further evaluate that conclusion, we continued to examine seed rain and seed banks in samples collected throughout the 80-acre mine site. To date, our studies indicate abundant seed rain from herbs and the invasive tree black locust (*Robinia pseudoacacia*). Colonization by native hardwoods is to sweet-birch (*Betula len-*

ta); a species with small wind-dispersed seeds. The results of follow-up experimental studies of seed germination and seedling establishment by four hardwood species will be presented and discussed in terms of developing a cost-effective, ecologically sound reclamation strategy. **(185)**

Harrison, Melinda and **David Dunbar*.** Cabrini College, Radnor, PA 19087 - *Bio2010 Meets Vision and Change in Undergraduate Biology Education: The HHMI SEA National Genomics Research Initiative*- This workshop advances recommendations from the 2011 *Vision and Change in Undergraduate Biology Education* and highlights the HHMI-sponsored Science Education Alliance (SEA) National Genomic Research Initiative, which has trained more than 1,600 students at 39 institutions in its first three years. Participating students conduct authentic research integrated into an introductory lab course built on themes and techniques across biology. Activities include isolating and characterizing bacterial viruses from the environment, preparing viral DNA for sequencing, and annotating and comparing sequenced genomes. Hear testimonies from faculty about lessons learned and recommendations for faculty seeking support for student research embedded into the curriculum. Time is planned for faculty to discuss implementation strategies at their respective institutions. Facilitators will provide an overview of a freshman course based on viral discovery, sharing course assessment data and their experiences from a small liberal arts college. **(69)**

Hart, James A.*[1], and **Fred J. Brenner[2].** [1]Wildlife Specialists, LLC [2]Grove City College. *The History of Bat Research in Pennsylvania*--Bat research in Pennsylvania can be said to have had its formative years with the publication of Samuel N. Rhoads "The Mammals of Pennsylvania and New Jersey" in 1903. Although naturalists and biologists had been collecting bats over the course of many years, this publication set the ground work for future perspectives on understanding the distributions of bats in the state as well as their importance, distribution and populations. With the stage set for future bat research in Pennsylvania, names like Stone, Mohr, Griffin, Hall, Brenner, Hassinger, Butchkoski and others would become synonymous with the study of bats, their ecology and conservation. This presentation will outline the history of bat research in the state as well as focus on the various research and conservation programs that were conducted or initiated by these people. As we enter a new era of study with additional emerging threats to bats and their habitats, we must focus more on the past in order to understand where we want to be in the future as far as the conservation of this economically important and ecologically functional group of mammals. **(2)**

Hayes, Lindsey*, Daniel Kreider, and **Lawrence Mylin**. Messiah College, Grantham, PA 17027. *Generation of a Simian Virus 40 Large Tumor Antigen (SV40 Tag) 529-543-specific T cell Receptor Transgenic Mouse* - To explore the role of tumor-specific CD4+ T cells in controlling growth of, and in regulation of tumor-induced (CD8+) T cell tolerance to SV40 T ag-induced murine tumors, we have identified residues 529-543 as a CD4+ T cell epitope within the SV40 T ag and have begun to characterize its immunogenicity in C57Bl/6 mice. We have undertaken to construct a T cell receptor (TCR) transgenic mouse in which all developing T cells will be programmed to express both the alpha and beta TCR subunits utilized by the LT529-543-specific CD4+ T cell hybridoma clone 4-15. LT529-543-specific CD4+ T cell frequency will be modulated in tumor-bearing animals by adoptive transfer of lymphocytes from the TCR transgenic mice. Nucleotide sequences corresponding to the unique combining regions of the clone 4-15 alpha and beta TCR subunits were obtained from partial cDNA clones generated by 5'RACE. Comparison to C57Bl/6 genomic sequences allowed for the construction of PCR primers needed to amplify the relevant recombined V-(D)-J sequences from clone 4-15 genomic DNA. Following sequence verification, the cloned V-(D)-J regions were ligated into alpha or beta TCR cassette expression vectors from which larger constant region and enhancer-bearing fragments could be excised for microinjection into day-old mouse embryos. **(198)**

Hepler, Nathan K.*, **Sarah A. Beatty**, and **Robert E. Carey**. Lebanon Valley College, Annville, PA 17003. *Expansins in Algal and Basal Land Plant Lineages* - Expansins are an important superfamily of plant cell wall loosening proteins. These proteins loosen the linkage between cellulose microfibrils in a non-enzymatic fashion, allowing these microfibrils to slide past one another. This study examines the nature of genes with homology to expansins retrieved from sequencing databases for unicellular chlorophytes**.** These sequences have relatively high identity with expansin domain 1 (40-45%) but only limited identity with domain 2 (10-30%). Bayesian phylogenies constructed using protein sequence data place these algal sequences as a monophyletic sister group to all land plant expansin families. These algal genes produce a phylogeny congruent with the species tree for these unicellular green algae and suggest that these sequences are an early branching expansin lineage, and not the result of horizontal gene transfers. Future work will examine the potential function of these genes in unicellular chlorophytes, which possess a cell wall that is very different from those of land plants. We have also developed a strategy for studying the function of expansin genes *in vivo* in the true moss *Physcomitrella patens*. We are using an established RNAi system to generate knockdown plants that have disruptions in the expression of multiple family members. **(23)**

Hines, D.*, E. Schramm, C. Sperger, and **K. Klemow.** Wilkes University, Wilkes-Barre, PA 18766. *Educating the Public about Marcellus Shale: an Informational Website for Northeastern Pennsylvania* – Since the first Marcellus shale well was drilling in Pennsylvania in 2003, natural gas development has rapidly increased in the state. Extensive media coverage brought attention to the benefits and drawbacks of the shale gas play. Many sources have a pro- or anti-development bias, which may skew public perception. We recognized a need for an unbiased source to accurately educate various stakeholders, which could lead to rational decision-making. Moreover, the short and unique history of natural gas development in Northeastern Pennsylvania argued for information specific to the region. In January 2011, the Institute for Energy and Environmental Research for Northeastern Pennsylvania (IEER) developed an information clearinghouse website to provide an unbiased source about the play. It grew to more than 250 pages, including a searchable library, news feed, and educational essays. Analysis of website usage was performed quarterly and annually. Through 2011, the site experienced 11,673 unique visits from 98 countries, representing over 50,000 page views. Financial support for the website comes from a contract with the Department of Energy's National Energy Technology Laboratory (NETL). **(80)**

Hinkel, Lauren*, Hannah Komar, Corey Shea, and **Manuel Ospina-Giraldo.** Lafayette College, Easton, PA 18042. *Characterization of the chitin synthase gene in Phytophthora* – The genus *Phytophthora* is comprised of host-specific plant pathogens. These organisms, classified as members of the Phylum Oomycota (Kingdom Stramenopila), possess cell walls comprised largely of cellulose. This characteristic makes them distinct from fungi, which have cell walls composed mostly of chitin. Our comparative genomic analyses indicate, however, that a chitin synthase (CS) gene is present in the genomes of three *Phytophthora* species. We have cloned and characterized the CS gene from *P. infestans* and *P. sojae*, two of the most economically important species of the genus *Phytophthora.* In *P. infestans*, the gene encodes a protein of 914 amino acids (aa) in length whereas in *P. sojae* the gene codes for 902-aa protein. A 77-bp intron appears to exist in *P. sojae*; no introns were found in the *P. infestans* gene. Expressed Sequence Tag (EST) evidence suggests the CS gene is expressed in mycelial cultures grown *in vitro*. In order to assess the significance of its presence and determine its role in *Phytophthora* physiology, we have constructed specific vectors aimed at inhibiting the CS gene expression through an siRNA-mediated silencing mechanism. **(25)**

Hoffman, Amanda* and **Nolan, Jessica.** York College of Pennsylvania, York, PA 17403. *The importance of vision and olfaction in Trachemys scripta elegans during prey capture*. -Within the last two decades, there has been increased sediment load in the waterways of Pennsylvania due to local urbanization and agricultural land use. It is unclear how the higher sediment loads will affect prey capture in local and invasive turtle species. Previous research demonstrated that *Chrysemys picta*, a native species to southern Pennsylvania, was not affected, but the senses utilized during capture were not studied. The objective of this study was to analyze which senses were used during prey capture to determine if sense compensation occurs when one sense is impaired. Five *Trachemys scripta elegans*, an invasive species in southern Pennsylvania, were placed in a 60 gallon tank in which a current was established. Prey was placed upstream at 30 cm and 120 cm from the turtle, and time to prey capture was recorded. Prey preference trials were also performed. Vision was the primary sense used by the turtles for prey capture. Overall, however, this study suggests that prey capture in *T. scripta elegans* should be only slightly affected by increased turbidities. **(178)**

Horn, Theresa* and **Jessica Nolan**. York College of Pennsylvania, York, PA 17403. *Optimizing the Diet of the Cortez Round Ray, Urobatis maculatus, at That Fish Place for Healthier Living*. - In recent years advances in aquarium technology have allowed home and offices to house increasingly exotic animals. Due to their exotic nature and the difficulties inherent in discovering marine diets, the natural diet or healthiest diet for many animals is unknown. Prior research has shown that negative physiological effects can occur when stingrays are fed unnatural diets. The objective of this study was to optimize the diet of Cortez round stingrays (*Urobatis maculatus*) housed within a touch tank at That Fish Place (Lancaster, PA). The stingrays were fed three diets, each for a period of one month, during which time respiration rates, food intake and activity levels were monitored. The first diet was varied, including krill, scallops, mussels, flounder and smelt. The second diet (squid) and third diet (flounder) each consisted of a single food item. Data analysis showed no significant difference in respiration rates (one-way ANOVA, p-value= 0.2136) or activity levels (one-way ANOVA, p-value= 0.6580) under any diet. However, the stingrays consumed significantly more food on the squid diet (one-way ANOVA, p-value=0.0027). This research indicates that future studies investigating physiological changes in response to changing diets may prove valuable in increasing the health of captive stingrays. **(164)**

Huey, Samantha L.* and **Alan B. Hale.** Cedar Crest College, Allentown, PA 18104. *Free Phage and Infected Hosts: The Relationship Between Time and Adsorption.* - The rate at which a bacteriophage adsorbs to its bacterial host is an important parameter when developing a phage therapy plan. A phage that quickly adheres to a pathogenic host and proceeds to replicate itself and ultimately lyse its host would likely be effective in controlling an infection. This research was designed to define the relationship between time and percent adsorption of phage CφSL1 to its host, *Escherichia coli*. Given that the standard top agar overlay procedure does not distinguish between initially adsorbed phage and those that

ultimately adsorb to the host after plating, centrifugation and filtration were incorporated into the protocol to estimate percent adsorption. Both free phage and *E. coli* with adsorbed phage were enumerated between the time of inoculation (t_0) and 90 min of adsorption. Adsorption occurs immediately and exhibits a curvilinear relationship before approaching an asymptote at t_{60}. This equilibrium is confirmed by the relationship between time and number of free phage. The data ultimately bring into question the value of the adsorption step in the top agar overlay procedure and also indicate that phage adsorb to their hosts more quickly than once thought; both are important considerations when choosing bacterial viruses for phage therapy. **(190)**

Huffman, Jane*. East Stroudsburg University, East Stroudsburg, PA. *Wildlife Forensics*. Crimes committed against wildlife might remain unsolved without forensic evidence to link individual animals to wildlife crime scenes. Scientific proof from bloodstains, antlers, and animal by-products enables law-enforcement personnel to identify and seek legal prosecution of suspects in crimes involving animals. This presentation will examine some of the principal technologies and applications available to wildlife forensic geneticists, focusing on the three most common casework questions: What species is it? Where did it come from? Who did it come from? The use of established research tools into forensic identification systems and the need for method validation at each stage of the analytical process, from sample collection to data analysis will be presented. The successful resolution of a case involving the poaching of wildlife, using molecular methods, is reported. **(202)**

Huffman, Jane and **Jamie Brobst*.** East Stroudsburg University, East Stroudsburg, PA. 18301. *Enumeration and Antibiotic Resistance Patterns of Escherichia coli Isolated from Mute Swans (Cygnus olor)* - Mute swans (*Cygnus olor*) from four New Jersey locations were surveyed for antibiotic resistant *Escherichia coli*. To determine the incidence of antibiotic resistance, *E. coli* was isolated from 110 mute swan cloacal swabs, and tested for resistance against tetracycline and ciprofloxacin. Isolation and detection of the resistant bacteria included the use of eosin methylene blue (EMB) agar and trypicase soy agar (TSA) infused with tetracycline or ciprofloxacin. Three of the four locations, Bivalve, Nantuxent Creek, and Bridgeport, yielded similar results for both detection of *E. coli* and prevalence of tetracycline-resistant bacteria. The population from Boonton Reservoir had a lower rate of *E. coli* and prevalence of tetracyline-resistant bacteria. Furthermore, only one mute swan tested positive for ciprofloxacin-resistant *E. coli*; this swan was from Bridgeport. The results of the Boonton Reservoir population may be attributed to its geographic location. The other locations have nearby agricultural fields, while Boonton Reservoir is isolated from such fields. Because many agricultural practices use antibiotics, particularly tetracycline, the agricultural run-off to the sampled locations may have increased the rate of development of antibiotic-resistant bacteria. **(145)**

Humbert, William S.[(1)]*, Pablo R. Delis[(1)], and Walter E. Meshaka, Jr.[(2)]. (1) Shippensburg University, Shippensburg PA, 17257, (2) State Museum of Pennsylvania, Harrisburg PA, 17120. *Morphometrics and Ecology of the American Toad (Anaxyrus americanus) at Letterkenny Army Depot, South Central Pennsylvania*. - Ecological characteristics of the American Toad (*Anaxyrus americanus*) vary geographically across its broad Eastern North American range. Yet generalizations for Pennsylvania populations are vague and require more site-specific studies to identify ecological patterns and to determine the extent to which abiotic factors influence those patterns. We examined ecological aspects of *A. americanus* at Letterkenny Army Depot (LEAD), Franklin Co., in south central Pennsylvania during March-October 2011. Drift fence arrays with pitfall and funnel traps were opened monthly for 7-day periods during which they were checked daily. Road and wetland surveys were conducted weekly to determine seasonal activity and length of the breeding season. Nineteen amplexing pairs were caught and measured to analyze any female preference and sexual dimorphisms. Comparisons of these data with abiotic factors revealed that pre- and post-breeding migration patterns were associated with temperature and rainfall and subject to elevational differences. Our results suggest that south central Pennsylvanian populations of *A. americanus* display morphological and ecological aspects intermediate of northern and southern regions. **(124)**

Hunter, Justin*, Jacquelyn Gallo*, Luke Dombert*, Nicholas Sweeney*, Erica Naperkowski and **Lisa Kadlec,** Wilkes University, Wilkes-Barre, PA 18766. *Characterization of novel epidermal growth factor receptor target genes implicated in Drosophila egg and wing development* – The *Drosophila* epidermal growth factor receptor (Egfr) gene encodes a protein that impacts multiple aspects of development including determination of body axes during oogenesis and proper formation of wings and eyes in later development. Our research follows from microarray screens performed to identify downstream targets of the Egfr pathway in the *Drosophila* ovary. These screens compared gene expression in ovaries of flies in which activity of the pathway was reduced, normal, or constitutively active. RT-PCR has confirmed the up-regulation of a number of targets originally seen by microarray. Several putative target genes demonstrate developmentally regulated expression in the ovary, and in some cases this expression has been shown to be altered in response to changes in Egfr signaling. We are currently investigating the expression, biological function, and mechanism of action of several target genes of unknown function (including CG11381, CG13083 and CG14309). Targeted gene knock-

down using RNAi suggests roles for these genes in eggshell and/or wing morphogenesis. We are also using *in situ* hybridization to investigate gene expression in the ovary and in wing imaginal discs and to evaluate the effectiveness of our targeted RNA interference, and a neutral red uptake assay to assess vitelline membrane integrity in compromised eggshells. **(58)**

Karnas*, K. Joy and **Audrey J. Ettinger*,** Cedar Crest College, Allentown, PA 18104. *BioLEAD: An Opportunity for Collaboration in Molecular Genetics, Neuroscience, and Developmental Biology Laboratories*—A cross-course collaborative project was developed in response to faculty observations that 1) original research projects facilitate student learning and 2) students tend to compartmentalize information learned in a single class and therefore have difficulty recognizing the connections among biology subfields. The incorporation of research into the laboratory classroom is not novel, but using a single project to interconnect two sub-disciplines within the biological sciences is an unusual pedagogical method. The research project, combining a classical chicken embryogenesis lab with a microarray genetic analysis, purposefully bridges multiple laboratory courses in order to facilitate student learning and help students see the relevance one class has to another. Results demonstrate enhanced student learning gains, even when students are not enrolled in both courses involved. Moving forward, the authors wish to broaden this project to include both new technologies, such as automated electrophysiology and PCR-based arrays, and additional collaborations across small colleges. Faculty from other institutions who are interested in joining this collaborative project at any level are encouraged to attend this talk and learn more. **(68)**

Kaur, Sandip*, Wajeeha R. Qureshi*, and **Audrey J. Ettinger.** Cedar Crest College, Allentown, PA 18104. *Stem cells in cichlid fish: Studying retinal progenitor cell differentiation and identifying stem cell niches in the brain of the model organism Rocio octofasciata* -- Model organisms are particularly useful for the study of neural stem cells because of the limited neurogenesis observed in mammals. The neural retina in *Rocio octofasciata*, commonly known as the Jack Dempsey cichlid fish, contains similar cell types to the mammalian retina, and the molecules involved in retinal development are highly conserved across a wide variety of animal species. In addition, the cichlid retina contains pluripotent stem cells, allowing for the growth and repair of the retina throughout the organism's lifetime. Based on data from other cichlid species, we expect to observe cell movement of differentiating retinal stem cells, reflecting interactions with distinct extracellular environments. We are also interested in identifying and labeling additional stem cell niches in the Jack Dempsey brain to gain a better understanding of conserved mechanisms of neurogenesis in vertebrates. Together, the study of stem cells in the retina and in the brain of cichlid fish will contribute to our understanding of stem cell therapies for human neurodegenerative diseases. **(56)**

Keler, Cynthia*. Delaware Valley College, Doylestown, PA 18901. *Isolation of Plant Growth Promoting Bacteria to Teach Basic Microbiological Concepts and Techniques; an Alternative Environmental Unknown Project* - Plant growth promoting bacteria (PGPR) found in the rhizosphere can easily be isolated from plant roots using a defined selective media. Some free PGPR often express the enzyme 1-aminocyclopropane-1-carboxylate (ACC) deaminase. This enzyme cleaves ACC, an intermediate in ethylene production in plants, into ammonia and α-ketobutyrate. Using serial dilution and M9 minimal media with ACC as the sole nitrogen source, students isolate bacteria from plant roots. In this first step students learn about selective media for isolating and growing bacteria, serial dilution and plating, bacteria enumeration and plant-microbe interactions. Once pure cultures are obtained students can easily test their isolates for plant growth promotion, auxin production and phosphate solubilization. Students then use basic biochemical testing and/or 16S rDNA sequencing to identify their isolates. In this step students learn Gram staining, differential media use to identify bacteria, flow chart construction and use of *Bergey's Manual*. Student ownership and involvement has led to interested students using their isolates in undergraduate research projects. Student reviews of this lab project using SALG surveys have been positive. **(82)**

Kerstetter, Trevor* and **Steven James.** Gettysburg College, Gettysburg, PA 17325. *Subdomain analysis of the BRDF checkpoint motif of the nimO^{Dbf4} regulator of DNA synthesis* - In the fungus *Aspergillus nidulans*, *nimO^{Dbf4}* encodes the regulatory subunit of the conserved Dbf4-dependent kinase (DDK). In all *Dbf4* orthologs the N-terminus harbors an approximately 100 amino acid checkpoint domain, the BRCT and DbF4-similarity domain (BRDF). *nimO^{Dbf4}* mutants lacking the BRDF (*nimO*ΔBRDF) become sensitive to a wide range of DNA damage agents and arrest meiosis early in prophase I. We discovered a unique suppressor, *snoA* (*s*uppressor-of-*n*im*O*), loss of which rescues both of these *nimO*ΔBRDF defects. *snoA* is orthologous with *Rif1*; in mammals, *Rif1* acts in a S-phase DNA damage checkpoint that responds to double strand breaks (DSBs). Not known for any *Dbf4* ortholog is whether the BRDF checkpoint and meiotic functions are separable into different subdomains. The BRDF contains consecutive two-stranded β-sheets surrounding an α-helix (Region I-II and Region III), followed by a pair of α-helices (Region IV). Based upon the predicted

secondary structure of the BRDF, we are using a rational approach to dissect its function(s) by creating five different in-frame subdomain deletions. We will test these in *snoA+* and *snoA* mutant backgrounds for their effects on DNA damage responses and meiotic proficiency. **(38)**

Kesslak, Lauren E.*, Tammy L. Smith, and **Theo Light.** Shippensburg University, Shippensburg, PA 17257. *Fish exposure to emerging contaminants in municipal wastewater: can dietary sewage contribution predict severity of estrogenic effects?*- Emerging contaminants in Pennsylvania waters include pharmaceuticals and other common chemicals with potential endocrine activity. Recent concern about these contaminants has focused on their presence in treated wastewater and effects on fish. Affected populations may show altered sex ratios or the presence of intersex (usually oocytes in male gonads). We sampled fish (blacknose dace *Rhinichthys atratulus)* upstream and downstream of wastewater treatment plants on three small streams in south-central Pennsylvania. Two of the three streams have been identified in a recent USGS survey as containing multiple pharmaceuticals in effluent-influenced sites. Twenty fish were collected at each site in May, July, and October 2011 using a backpack electrofisher. The presence and severity of intersex was determined using histology and microscopy, and dietary exposure to sewage was assessed by means of stable isotope analysis. We found evidence of intersex in three fish downstream of two sewage treatment plants, but no evidence of altered sex ratios. This is, to our knowledge, the first documentation of intersex in this common minnow species. With analysis of the isotope data and USGS contaminant measures in each stream, we hope to establish a robust link between exposure to effluent-derived pharmaceuticals and markers of estrogen disruption in fish. **(64)**

Klemow, Kenneth M*. Wilkes University, Wilkes-Barre, PA 18766. *Achieving an accurate public understanding of Marcellus shale gas impacts: opportunities for scientists and educators* - The debate over shale gas extraction has dominated public attention in Pennsylvania. Proponents view it as a critical part of America's move toward energy independence. Opponents express concern over impacts to water, air, natural ecosystems, and communities. Since many of the impacts are poorly known, proponents and opponents alike point to the need for "more study" to resolve the debate – typically in their favor. Effective policy will be guided by sound objective information if three conditions are met: (1) excellent science is performed by unbiased researchers, (2) the research is effectively communicated to diverse stakeholders, (3) the stakeholder communities accept the research findings and use it to guide policy. The public's reaction to key studies on shale impacts published in 2011 has been disheartening. Studies critical of shale gas development have been embraced by opponents, but rejected by proponents. The opposite is true for studies that show minor impacts of shale development. To facilitate wise decision-making, opponents and proponents alike must put aside their preconceived biases and view the science more objectively. But is that possible? This presentation will recommend steps that scientists and educators can take to help to foster objective acceptance of the science by the public. **(71)**

Korpics, Samantha,* Christina Morra, and **Amy J. Reese.** Cedar Crest College, Allentown PA 18104. *Let's Break This Down: Can Alpha-1,3-Glucanase Be Used to Break the Attachment of Capsule from 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 the alpha-1,3-glucan. The aim of this project is to overexpress the putative catalytic domains of the alpha-1,3-glucanases in a yeast expression system (*Kluvermyces lactis*, pKLAC-2*)*. The four gene segments have been amplified from cDNA, shown to be the predicted size by DNA electrophoresis, and ligated into the pKLAC2 vector. Transformants are being screened for correct constructs. Once verified, the correct plasmids will be transformed into the *K. lactis* for large-scale protein expression. The resulting enzyme product (crude or purified) will be used as a reagent for cell wall degradation. The overall goal of this research is to better understand the role(s) of alpha-1,3-glucanases in cryptococcal capsule binding and regulation. If glucanases can interrupt capsule binding, this enzyme treatment approach might provide a model for future therapeutics to better control infections caused by this fungus. **(37)**

Krebs*, Jordan, Tom Sontag, and **Jeffrey Newman.** Lycoming College, Williamsport, PA 17701. *Genome Sequencing of Lycomia zaccaria gen. nov sp nov., Chryseobacterium haifense, and Kaistella koreensis and Comparison to Two Closely Related Genomes*. – The bacterial strain JJC was identified as potentially novel during study as an environmental unknown organism in a General Microbiology Lab. Phenotypic characterization suggested that the organism was a novel genus, with clear differences in lipid composition, pigment production, antibiotic sensitivity and protein coding gene sequences from its closest relatives. Whole genome sequencing of this and the type strains of the two most closely related named species through GCAT-SEEK has allowed comparison to the previously sequenced genomes of Flavobacteriaceae sp. 3519-10 and *Chryseobacterium gleum*. The genomes were sequenced using Ion Torrent or 454 technology, assembled using the NextGENE and/or Geneious software and annotated with Rapid Annotation using Subsystem

Technology (RAST). Comparisons of these five genomes has clarified the phylogenetic relationships of the organisms and supports the assignment of JJC and Flavobacteriaceae sp. 3519-10 to a novel genus for which the name *Lycomia* is proposed. **(129)**

Kulp, Alyssa [1*], Amanda Jenkins[1], Lindsay M. Carl[2], Collin J. Straka[2], Anderson L. Marsh[2], Rebecca A. Urban[1] [1]Biology Department, Lebanon Valley College, 101 N. College Ave, Annville, PA 17003 [2]Chemistry Department, Lebanon Valley College, 101 N. College Ave, Annville, PA 17003. *The effect of zinc sulfide nanopartiles on Spirodela polyrhiza* - Engineered nanoparticles (ENPs) are manmade particles around one billionth of a meter; to maintain their small size, ENPs are "capped" with different molecules. ENPs consisting of zinc sulfide possess several practical applications, notably in the manufacture of flat-panel displays and lasers. Unfortunately, ENPs are a potential cause of environmental damage. To examine how different capping agents on ENPs influence phytotoxicity, we synthesized zinc sulfide nanoparticles coated with one of three polymers (polyphosphate, polyvinylpyrrilodine, and L-Histidine). Four concentrations of these nanoparticles were then placed in flasks containing a nutrient solution and the aquatic plant *Spirodela polyrhiza*. As concentrations of the ENPs increased, the relative growth rate, green frond count, and chlorophyll a concentrations of *S. polyrhiza* decreased. When comparing the effect different capping agents had on *S. polyrhiza* at the highest concentration (1000 mg/L), L-Histidine was found to have the most detrimental effect on the above parameters. In contrast, the polyphosphate showed the least effect at the 1000 mg/L treatment. High concentrations of zinc sulfide ENPs are deleterious to *S. polyrhiza* and possibly other aquatic organisms, a conclusion with ramifications for industries utilizing ENPs. Additionally, the physical and chemical characteristics of ENPs appear to significantly influence their potential toxicity. **(105)**

Kunster, Olivia*, Sarah R. Crane, Nicholas J. Petersen, Fred J. Brenner[1] and **Shawn Rummel[2].** Grove City College[1], Grove City, PA and Trout Unlimited[2]. *Comparison of Mitochondrial D-Loop Sequences in Brook Trout (Salvelinus fontinalis) Collected From Isolated Populations*.- Brook trout (*Salvelineus fontinalis*) were collected from 13 tributaries of the west branch of the Susquehanna River that have been impacted by acid mine discharges for over 50 years, thereby isolating the brook trout populations in the upper reaches of each tributaries. A fin clip was collected from each fish, preserved in 70 percent ethanol and the mtDNA isolated using Giagen Gentra PUREGENE® DNA purification kit. Primers were designed to amplify the mtDNA 1000 base pair control (D-loop) region. The primers were located in the proline (FL16564, forward) and phenylanline FH993, reverse tRNA genes. Following PCR the products were assessed using the Vitrogen E-Gel slab gel system and purified using QIAquick PCR Purification Kit. After verification the PCR product, the sample was prepared for sequencing using a Dideoxy preparation (prepared in cycle sequencing reactions) and purified using a DyeEx Spin Kit and sequenced using ABI 310 Genetic Analyzer. The number of SNPs and percent homology among the different population was used to determine if the different populations were genetically isolated. **(125)**

Kurt, Robert and **Alicia Bartley*.** Lafayette College, Easton, PA 18042. *Comparison of 4T1 tumors in BALB/c mice injected orthotopically and subcutaneously* - The study was initiated to investigate whether injecting BALB/c mice subcutaneously versus orthotopically with 4T1 tumor cells results in altered tumor presentation. It was hypothesized that there would be minimal difference between tumor growth and metastasis in mice injected subcutaneously in the hind flank and mice injected orthotopically in the mammary fat pad. To test this hypothesis equal numbers of female mice were injected with 4T1 tumor cells and sacrificed on the 21st day. Tumors, livers, lungs, and brains were harvested from the animals. Organs were cultured to screen for the presence of metastasis. RNA was obtained from the tumors, and used to screen for expression of gapdh, TGFβ, MMP9, VEGF, CCL2, and CCL5 using Quantitative RT-PCR. So far we have found that tumor growth rates were comparable in both test groups, and PCR data showed similarities in cytokine expression in animals injected subcutaneously and orthotopically. The presence of metastasis in harvested organs was also congruent in the test subjects. The data so far suggests that 4T1 tumors will have the same effect in mouse models regardless of whether mice are injected orthotopically or subcutaneously. These results have implications on how cancer research is conducted in mouse models. **(201)**

Kurt, Robert, and **Christine Vrakas*.** Lafayette College, Easton, PA 18045. *The Measure of Damage Associated Molecular Pattern Molecules and their Role in Recruiting Regulatory T Cells and Myeloid Derived 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 cells to sites of metastasis. To determine which DAMPs were expressed we screened six DAMPs in brain, liver and lung tissues of naïve, female mice. QPCR was done on tissue samples and we found that S100A8 and HSP70A1B had higher expression in the lungs, where the highest level of metastasis occurs. We are in the process of measuring the relative expression of DAMPs specifically S100A8 and HSP70A1B, Tregs using CD25 and FoxP3 as markers, and MDSC using CD11b and IL10 as markers from lung tissue. This will be done in four-week increments, starting when the mice are injected with cancer. By isolating the lungs from the

tumor bearing mice, obtaining mRNA, converting mRNA to cDNA and running QPCR the relative expression of DAMPs, Tregs and MDSC can be followed over time. Results from this study may reveal the connection between DAMPs and recruitment of Tregs and MDSC to sites of metastasis. **(13)**

Lan Junxing* and **Candie Wilderman.** Dickinson College, Carlisle, PA 17013. *Evaluation of Impact of Precipitation and Land-Use Change on Stream Flow in Monocacy Creek, Using Hydrological Modeling.*--This research evaluates the impact that land use conversion has on the stream flow of Monocacy Creek, Northampton County, PA from 1958 to 2008. It provides a quantitative assessment of the relationship between watershed land use and water quantity of the limestone stream. We built a hydrological model in the Hydrological Modeling System (HEC-HMS) environment that was calibrated with local streamflow data. The parameters of land use from 1958, 1986 and 2008 were obtained from aerial imagery and processed in the ArcGIS environment before entering into the model. As the land use in the watershed has become more urbanized throughout the time period, direct runoff to the stream due to land use has increased. Based on the model, the 30% increase of urbanization in the form of residential, industrial and commercial development since 1958 has led to a 20% increase of direct runoff to the stream, confirming that the land-use development has a significant impact on the streamflow of Monocacy Creek. With the input of potential future land use in the watershed, this model is able to simulate the streamflow of Monocacy Creek and thus inform future planning decisions. **(150)**

Laubach, Larry*, Megan Flynn, Danielle Mislinski, and Howard P. Whidden. Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA 18301. *Acoustic Transects for Monitoring Bat Activity in the Delaware Water Gap National Recreation Area* – Since the appearance of White-nose Syndrome (WNS) in the winter of 2006-2007, millions of hibernating bats have died in the United States and Canada. To understand the effects of WNS on bat activity and distribution, baseline data are needed to monitor population changes over time. We used an established protocol of driven acoustic transects to assess bat activity and distribution in the Delaware Water Gap National Recreation Area in eastern Pennsylvania and western New Jersey. An AnaBat SD2 detector was mounted on the roof of a car and driven at <20 mph along a 77-mile transect route on 12 nights between 1 June and 15 July 2010 and 14 nights between 1 June and 15 July 2011. Recorded calls were identified using the program AnaLook and classified into high-frequency and low-frequency species groups. In both years, the majority of calls belonged to the low-frequency group. Areas along the Delaware River, including Route 611 in PA and Old Mine Road in NJ, showed the highest activity levels. Our data on bat activity levels after WNS are being used to identify surviving populations and develop bat conservation and management strategies for the Delaware Water Gap National Recreation Area. **(7)**

Lavarias, Maia* and **Wendy Boehmler.** York College of Pennsylvania, York, PA 17405. *The Cloning and Expression of SNAP-25a and b in Zebrafish*- Synaptosomal-associated protein of 25 kDa (SNAP-25) is a protein that is part of the presynaptic plasma membrane SNARE complex. SNAP-25 is critical for the docking and fusion of the synaptic vesicle to the plasma membrane of the presynaptic terminal thereby playing an important role in neurotransmitter release. This protein is cleaved by the botulinum toxin (BoNT) which inhibits neurotransmitter release. Because BoNT exposure can be deadly, it poses a threat as a bioweapon. Therefore, it would be beneficial to identify inhibitors to this neurotoxin. Zebrafish are an increasingly used model system for human disease and drug discovery. We mined the zebrafish EST database and identified two novel zebrafish SNAP-25 homologs. Using a reverse transcriptase polymerase chain reaction (RT-PCR) strategy, we generated approximately 600 base pair cDNAs for both genes (a and b). We used the same RT-PCR approach in order to reveal differential expression of the two genes during zebrafish development. In the adult zebrafish, robust expression of both SNAP-25a and b was revealed in the brain, eye, heart, and muscle tissues. It will be of interest to determine whether BoNT cleavage of SNAP-25 can be inhibited by compounds identified by using high through-put zebrafish drug screening assays. **(46)**

Leffler, Amanda*, Frank L. Dorman, and **Adriana De Armas.** The Pennsylvania State University, University Park, PA, 16802. *Chromatographic Analysis of Synthetic Amphetamine Street Samples*- Synthetic amphetamines, or "legal highs", are entering the drug market faster than they can be restricted. Analysis of such designer drugs and the determination of their individual compounds may help ban their production and illegalize their use. A quick and efficient extraction method will allow for a more efficient analysis of such compounds. In regards to the forensic community, crime labs already have a large workload. Thus creating a more efficient methodology will benefit analysts by increasing the amount of evidence that they can process in a given time. This presentation will discuss the development of the extraction of the drug compounds from various commercial media, followed by separation using gas chromatography with mass spectrometric detection (GC-MS). The developed chromatographic method provides qualitative and quantitative analysis of synthetic amphetamines in the compounds based on the use of appropriate standards. An HPLC method to fraction

collect compounds in multi-component samples using a PDA detector will also be discussed and how direct infusion MS/MS is crucial in further identification of unknown samples. Potentially this method could reduce the time a new drug is on the market. **(204)**

Legters, Courtney*, Ashley Church*, Larae Tymochko and **Michael A. Elnitsky.** Mercyhurst University, Erie, PA 16546. *Seasonal development of cold tolerance and overwintering physiology 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 during summer and early fall to freeze tolerant during late fall and winter. This long-term project investigates the environmental conditions that induce the acquisition of freeze tolerance and the overwintering physiology of the gall fly. Goldenrod galls were collected on a weekly basis during autumn from 2009-2011, and the larvae extracted to monitor changes in supercooling point, freeze tolerance, hemolymph osmolality, and body water content. In addition to declining ambient temperature, gall water content declined throughout autumn, with a marked drop in mid-October corresponding to plant senescence. These changes in environmental conditions were correlated with increased larval freeze tolerance, hemolymph osmolality, and supercooling point. We have also begun to assess the effects of future climate warming on the microhabitat conditions, cell survival, larval development, adult emergence, and reproductive output of the goldenrod gall fly. These results provide insight as to the likely impacts of climate change on the overwintering physiology of naturally freeze tolerance insects. **(167)**

Lowenberger, Lauren K.*, Brandan L. Gray, and **Clay E. Corbin.** Bloomsburg University of Pennsylvania, Bloomsburg, PA 17815. *Morphology, Bite-Force, and Bill Closing Velocity in North American Birds*- Adaptation and muscle physiology theories predict a trade-off between bite-force (BF) and closing velocity (CV) among bird species. No study has tested this using wild birds sampled from a broad phylogenetic perspective. We collected feeding video, BF from a transducer, and measurements on museum skulls for 18 North American bird species. We constructed a composite phylogeny from the literature. Uni- and multivariate procedures were used to test 1) for a morphological prediction of BF and CV, 2) a trade-off between the two and, 3) if these three factors have co-evolved. While negative, the BF vs CV relationship is not significant. However, anatomical measurements associated with the coronoid process and lower jaw length are excellent predictors of BF and CV. The latter findings are significant. Hence, morphology and BF, and morphology and CV have co-evolved in birds. However, the uncoupling of BF and CV in our data is puzzling and may be a product of insufficient taxon sampling, sample size, and/or sampling error. **(112)**

Mahoney, Chelsea*, Kayla Hager, and **André Walther**. Cedar Crest College, Allentown, PA 18104. *Identification of phosphorylation dependent interactions between Replication Protein A and cellular proteins in the Saccharomyces cerevisiae.* Replication Protein A (RPA) is a highly conserved, single stranded DNA binding protein involved in DNA replication, repair and recombination. RPA is composed of three subunits: RPA1, RPA2 and RPA3, and physically interacts with a number of proteins involved in cellular processes. RPA is phosphorylated in a cell cycle dependent manner and in response to DNA damaging agents suggesting a role in regulating RPA function in the cell. To better understand the cellular functions of RPA, we are using Yeast Two Hybrid (Y2H) analysis to indentify novel proteins that physically interact with RPA in a phosphorylation dependent manner. We have developed Y2H expression vectors that fuse the GAL4 DNA binding domain (GAL4BD) to each of the subunits of RPA as well as forms of RPA2 with mutations that mimic constitutive phosphorylation. Vectors expressing these fusion proteins were combined with either genomic or cDNA libraries of yeast proteins fused to the GAL4 activating domain (GAL4AD) and transformed into *Saccharomyces cerevisiae*. We have identified a number of proteins that physically interact with a constitutively phosphorylated for of RPA, and have preliminary evidence that some of these interactions may be dependent on RPA phosphorylation. **(32)**

Manaquale, Frank M.*, Patrick Naughten, Maureen A. Levri, and **Edward P. Levri.** Penn State-Altoona, Altoona, PA 16601. *Seed germination rate is not influenced by inflorescence number or size 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 or number of inflorescences on a plant and the proportion of seeds that germinate. Twenty-five plants were utilized in the Seminar Forest on the Penn State Altoona campus. Inflorescences and flowers per inflorescence were determined for each plant. Five seeds from each of five fruits from five different inflorescences per plant were planted in the greenhouse and the rate of germination was determined for each fruit. A preliminary analysis of the data suggests that there is no relationship between floral traits and the probability of seed germination. Possible reasons for this result will be discussed. **(181)**

Maresca, Gregory* and **Tammy Tintjer**. King's College, Wilkes-Barre, PA 18711. *Comparison of Fungal Endophyte Detection Methods in Seeds and Infection Frequencies in Conservation Seeds* - Cool-season grasses are widely used for forage, turf, reclamation, and conservation plantings. Endophytic fungi are common, seed-transmitted symbionts of cool-season grasses in North America. Effects of endophyte infection on the grass include enhanced drought resistance

and tolerance, herbivore resistance, and enhanced competitive ability. Community-level effects of endophyte-infected grasses have also been observed, for example a reduction in species diversity and inhibition of old-field succession. From a conservation perspective, unknowingly planting endophyte-infected seeds may have unintended effects on community development. This study was undertaken to test three different staining protocols: Clark method, Wilson method, and Saha method to determine which staining protocol would be the most effective to visualize the infection within the seed. Seeds on which the protocol were developed, *Lolium perenne* (Perennial Ryegrass) and *Schedonorus phoenix (Tall Fescue)*, were used to test each method for ease of application and reliability of infection detection. The preferred method was then used to test the frequency of infection in the seeds of additional grass species from various conservation seed suppliers. Recommendations of detection methods are important for fungal endophyte research; while the proportion of endophyte-infected conservation seeds has implications for seed choices in conservation plantings. **(107)**

Marietti, Marissa L.*, Diane I. Fitch*, Samantha Kitts*, Amanda E. Rocklyn*, and **Audrey J. Ettinger.** Cedar Crest College; Allentown, PA 18104. *Ginkgo biloba may play a role in reducing or preventing damage in a primary neuronal model of ischemia -- Gingko biloba* extract (EGb) has been used over hundreds of years as a natural healing remedy. The extract has been shown to have antioxidant qualities; supplementation with EGb may thus be helpful for improving blood circulation and memory. Recent studies have tested the efficacy of EGb as a treatment supporting neuronal health in a multitude of nervous system diseases including Alzheimer's disease and generalized memory loss. Ischemic stroke is a traumatic neural event causing severe loss of cognitive function, limb movement, or even death when left untreated; current treatments are limited to clot-busting drugs which must be delivered within four hours of the stroke. We have used glutamate to induce apoptotic cell death in a chicken primary neuronal culture, and have begun testing whether *Ginkgo biloba* can be used to prevent stroke-induced damage or to block further cell death post-stroke. Cultures were analyzed for live, dead, and apoptotic cells and preliminary results support the efficacy of *Ginkgo biloba* as a stroke therapy. **(55)**

Marll, Michael*, Trevor Kerstetter, and Steven James. Gettysburg College, Gettysburg, PA. *Coping with stalled replication forks: investigating the roles of DNA repair genes and checkpoint regulators in the S phase DNA Damage Response.* We study DNA damage checkpoint and repair pathways that enable cells to survive the stalling of replication forks (RFs) during DNA synthesis (S-phase). We are examining the roles of three checkpoint and DNA repair genes in the fungus *Aspergillus nidulans*: the Holliday Junction resolvase *mus81/eme1* aids in repair by performing structure specific cleavage at collapsed RFs; the checkpoint kinase *chkA*^{Chk1} recruits several proteins that stabilize stalled RFs; and the DNA synthesis regulator *nimO*^{Dbf4} arrests S-phase progression via a N-terminal checkpoint domain, the BRDF (**BR**CT and **D**b**f**4-similiarity domain). Double mutants carrying deletions of *chkA* and *mus81* are synthetically lethal with a *nimO* mutant lacking the BRDF domain (*nimO*ΔBRDF Δ*chkA* and *nimO*ΔBRDF Δ*mus81*). This suggests that *nimO* acts in a pathway distinct from *chkA* and *mus8*1. Each of these three single mutants enhances sensitivity to double strand break (DSB)-inducing chemicals. We have discovered mutations in a fourth gene, snoA^{Rif1} (*s*uppressor of *n*im*O*), that reduce the DNA damage sensitivities of *nimO*ΔBRDF and Δ*chkA* single mutants. To determine whether *chkA* and *mus81* act through different pathways and to identify other pathways that may be influenced by *snoA*, we are assessing genetic interactions in double mutants carrying, *e.g.*, Δ*chkA* Δ*mus81* and Δ*mus81* Δ*snoA*, as well various triple mutant combinations. **(31)**

Martin, Elliot* and **Bradley Rehnberg.** York College of Pennsylvania, York, PA 17403. *Painted lady butterfly (Vanessa cardui) preferences for amino acids in solution* – Flowers pollinated by butterflies contain nectars which are rich in sugars and amino acids. Nectar amino acids are nutritionally important for oogenesis and spermatogenesis in painted lady butterflies (*Vanessa cardui*). Six structurally diverse amino acids commonly found in nectars were tested at 16 μM: alanine, phenylalanine, glycine, asparagine, glutamic acid, and serine. Groups of 2-11 butterflies were presented with three solutions in 1 mL centrifuge tubes. Two of the centrifuge tubes contained different amino acid solutions while the third contained water. Amino acid solutions and water were replaced daily and the amounts consumed were measured as a mass difference. Preferences for the six amino acids were highly variable with glycine most favored ($P<0.001$, Kruskal-Wallis Test) and serine least favored ($P<0.001$, ANOVA). **(169)**

Mascibroda, Laura,* and **Amy J. Reese.** Cedar Crest College, Allentown PA 18104. *Determination of the Natural Expression of Alpha-1,3-Glucanase in Cryptococcus neoformans* - Fungi are found throughout the environment, and can either be helpful or cause disease. *Cryptococcus neoformans* causes pulmonary and systemic infections in immunocompromised people. A polysaccharide capsule conveys virulence and is bound to the fungus by cell wall alpha-1,3-glucan. Alpha-1,3-glucanases are thought to be responsible for breaking down alpha-1,3-glucan, which is likely key in the process of asexual budding. While up to two alpha-1,3-glucanases have been found in fungi studied to date, the *C. neoformans* genome has four genes on separate chromosomes. It is not yet known if all of these genes are functional, at what levels they are expressed, or the function of the gene products. Our goal is to understand the natural expression levels of these genes to begin to understand their purpose. Quantitative reverse transcription polymerase chain reaction is being used to determine the expression levels of each the four alpha-1,3-glucanase genes under different conditions.

Preliminary results show that three of the four genes are expressed at varying levels under normal growth conditions at 37 °C. By understanding the role of alpha-1,3-glucanase in capsule regulation, we might be able to exploit ways to remove capsule from cells in a patient situation, thereby allowing individuals to clear infections. **(22)**

Mast, Jesse*, Ronald Kaltreider, and **Bradley Rehnberg** York College of Pennsylvania, York, PA 17405. *The relationship of pre-natal diet to body weight and subcutaneous fat of adult offspring in CD1 mice* - Obesity is linked to a diet high in fat and sugar and a lack of exercise, but there may be unknown causes as well. In order to determine if there is a relationship between prenatal diet and body weight and subcutaneous fat of adult offspring, 8 pregnant female CD1 mice were fed one of 4 diets: high fat, high sugar, high fat and high sugar, or control throughout their 21-day pregnancies. At birth all subjects 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. The skin from the trunk of the animal was removed and shaved, and the Folch method of lipid extraction was used to quantify subcutaneous fat. **(57)**

Mast, Jesse*, Ronald Kaltreider, and Bradley Rehnberg. York College of Pennsylvania, York, PA 17403. *The relationship of pre-natal diet to body weight and subcutaneous fat in adult offspring in CD-1 mice.* Obesity is linked to a diet high in fat and sugar and a lack of exercise, but there may be unknown causes as well. In order to determine if prenatal diet is related to body weight and subcutaneous fat of adult offspring, 8 pregnant CD-1 mice were fed one of 4 diets: high fat, high sugar, high fat and high sugar, or control throughout their 21-day pregnancies. Mothers after birth and pups after weaning 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. Skin from the trunk of the animal was removed and shaved, and the Folch method of lipid extraction was used to quantify fat. Preliminary data analyses show considerable variation in body weight and subcutaneous fat content of adult offspring across all diets.

Mauser, Holly* and **Tammy Tobin.** Susquehanna University, Selinsgrove, PA 17870. *Presence of Sulfur Oxidizing and Sulfate Reducing Bacteria at the Site of the Centralia Mine Fire* - The purpose of this research is to develop an understanding of the role of sulfur bacteria in soils overlying the Centralia coalmine fire, where the concentrations of both elemental sulfur and sulfate are often elevated. The presence of sulfur oxidizers and sulfate reducers is being determined using both culture-dependent and DNA-based culture-independent analyses. In order to begin these studies, surface soil samples were collected from sampling sites at 49°C and 69°C. The samples were inoculated in sulfate API broth to enrich sulfate reducers and in sulfur broth to enrich sulfur oxidizers. Individual colonies are currently being isolated from the resulting growth and will be identified using metabolic analyses and 16S rRNA gene sequencing. DNA was also extracted from the same soil samples, and is being used to detect the presence of sulfur bacteria using aprA gene primers specific to sulfate reducers and sulfur oxidizers. **(90)**

McCoy, Jazzmyn*, and **Cristen L. Rosch**. Kutztown University, Kutztown, PA 19530. *Teratogenicity and Mutagenicity of the Natural Insecticide Catnip Oil.* Teratogens are chemical or environmental agents that cause birth abnormalities in developing embryos. This project focused on the teratogenic potential of catnip oil using the synthetic insect repellent DEET as a comparative control. Recently, catnip oil was shown to be effective in repelling mosquitoes and a good alternative to DEET for use as an insect repellent. This project was designed to determine if the fetal growth of chickens is adversely affected by prenatal exposure to catnip oil containing nepetalactone, and if an increase in dosage of the insecticide contributed to more severe birth defects. The effects of catnip oil on the fetal growth of chickens was studied at the anatomical level by noting birth weight and abnormal external structures of 14-day old chick embryos exposed to varying doses of the oil. Since other research has shown that some pesticides decrease acetylcholinesterase activity in the brain, the latissimus dorsi muscle of catnip oil treated embryos was stained to detect the presence of acetylcholinesterase activity. With the use of catnip oil as a substitute for the insecticide DEET, it is important to determine if this chemical adversely affects embryonic development in vertebrates. **(62)**

McQuilken, Molly* and **André P. Walther**. Cedar Crest College, Allentown, PA 18104. *Phosphorylation Replication Protein A Plays a Role in Telomere Length Maintenance in Saccharomyces cerevisiae* – Telomeres are nucleoprotein structures that protect chromosomal ends from degradation in humans and yeast. Replication Protein A (RPA) is a highly conserved, single-stranded DNA binding protein that is phosphorylated in a cell cycle dependent manner and involved in telomere synthesis. We generated strains of *Saccharomyces cerevisiae* containing mutations in the N-terminus of *RFA2* subunit of *RPA* that inhibit or mimic constitutive phosphorylation, and examined telomeres using Southern analysis and senescence studies. Mutations that cause constitutive RPA phosphorylation (*rfa2-Asp*) lead to short telomeres, while mutations that prevent phosphorylation of RPA (*rfa2-Ala*) lead to long telomeres. We have been identifying the genetic requirements for these phenotypes by mutating known telomere maintenance genes in these mutant RPA strains. We have observed an epistatic relationship between phosphorylated *RFA2* and *KU70*, indicating that telomeres shorten in a *KU70* dependent fashion. Non-epistatic interactions with *TELI*, *SLX8*, and *DOA4* were observed indicating that when

RPA is phosphorylated, telomeres shorten in a *TELI*, *SLX8*, and *DOA4* independent fashion. These complex genetic interactions between the phosphorylated *RFA2* subunit of *RPA* and the different telomere maintenance genes allowed for the determination of a novel mechanism for telomere length maintenance. **(20)**

Meindl, George A.* and **Tia-Lynn Ashman**. University of Pittsburgh, Pittsburgh, PA, 15260. *The influence of serpentine soil chemistry on plant morphology and plant-animal interactions: an experimental test of the common monkey-flower, Mimulus guttatus*. -Unusual soil conditions contribute to plant speciation via physiological adaptation. The impact of these edaphic factors on biotic interactions, however, is poorly understood, yet it may also contribute to reproductive isolation. Serpentine soils are characterized by (i) a low Ca/Mg ratio, (ii) mineral nutrient deficiencies (N, P, K), (iii) poor water retention and (iv) high concentrations of heavy metals (Co, Cr, Ni). For serpentine adapted plant species, these edaphic factors may result in changes in plant morphology and chemistry, which may alter plant-animal interactions. Observations of *Mimulus guttatus* have shown that serpentine plants produce fewer, smaller flowers, shorter inflorescences and receive fewer pollinator visits and less damage from florivores relative to non-serpentine plants. Using an experimental approach, here we examine the influence of serpentine soil chemistry on plant morphology and plant-animal interactions for *M. guttatus*. Specifically, we address the following questions: (1) Do plants grown in serpentine vs. non-serpentine soil differ morphologically? (2) In artificial arrays of inflorescences placed in the field, are flowers collected from serpentine vs. non-serpentine populations equally likely to be visited by pollinators? (3) In artificial arrays of potted plants, do plants grown in serpentine vs. non-serpentine soil receive similar levels of florivory? **(183)**

Miller, Elizabeth*, Benjamin Hallowell, and **Lawrence Mylin.** Messiah College, Grantham, PA 17027. *Comparing the immunological potencies of two viral epitopes: LT529-543 from the Simian virus 40 Large Tumor Antigen (SV40 T ag) vs. a related epitope from the Large Tumor Antigen of murine Polyomavirus*- The results of this study are part of our ongoing effort to understand factors which control the efficiency with which tumor epitope-specific CD8+ T lymphocytes can control the progression of SV40 T ag-induced tumors in murine models. We wish to explore the requirement and role of SV40 T ag-specific CD4+ T cells in establishing and maintaining tumor control and regulating tumor-induced (CD8+) T cell tolerance. We have recently identified residues 529-543 as a CD4+ epitope within the SV40 T ag. We are interested in understanding why this epitope appears to be weakly immunogenic within SV40 T ag. To address this question, the immunogenicities of synthetic peptides corresponding to SV40 T ag LT529-543 and murine Polyomavirus Large T antigen (mPyT) LT678-690 were compared in C57Bl/6 mice using ELISPOT assays. While the mPyT LT678-690 peptide was shown to be strongly immunogenic within the context of mPy viral infections by others, synthetic mPyT LT678-690 and SV40 T ag LT529-543 peptides induced similar, but low levels of CD4+ T cells. These results suggest that the lack of virus-induced immunity may limit the immunological potency of the mPyT 678-690 epitope and that the two epitopes may possess similar intrinsic immunogenic properties. **(199)**

Mingora, Christina, Jason Ewer*, Chrispin Otondi and **Manuel Ospina-Giraldo.** Lafayette College, Easton, PA 18042. *Analysis of the pectin methylesterase gene family in Phytophthora infestans – Phytophthora infestans* is the causal agent of the late blight disease of potatoes, which was closely associated with the Irish potato famine of the 1840s, and continues to cause billions of dollars in crop losses today. The physical infection mechanism of these oomycetes (fungal-like organisms currently classified within the Kingdom Stramenopila) involves the penetration of the plant cell wall by the hyphae. It is thought that certain enzymes such as pectin methylesterases (PME) are involved in the infection mechanism. We have scanned the *P. infestans* genome for the presence of putative PME genes and conducted a sequence analysis of all gene models found. We also searched for potential regulatory motifs in the promoter region of the proposed *P. infestans* models, and investigated the gene expression levels throughout the course of *P. infestans* infection, using *in planta* and detached leaf assays. We found that genes located on contiguous chromosomal regions contain similar motifs in the promoter region, indicating the possibility of a shared regulatory mechanism. Results of our investigations also suggest that expression levels of some of the analyzed genes vary considerably when compared to basal expression found in *in vitro* cultures of non-sporulating mycelium. **(24)**

Miozzi, Nicole*, Maria Antunez, and **Marlene Cross.** Mercyhurst University, Erie, PA 16546. *Soil Microbial Diversity in Conventionally Fertilized Farm Land and the Effect of Organic Amendments on Microbial Diversity and Crop Yield* - The focus of this three year study, conducted at Mercyhurst West Farm, was to monitor the changes in microbial diversity in farm soil during the change from conventionally farmed land to organically farmed land and to compare several different organic amendments to determine an effective way to make this transition. Soil microbial diversity is considered to be an important parameter of soil health and fertility. Organic treatments, including compost, algae and biochar, were used, as well as a control treatment with no amendments and a non-organic chemically fertilized treatment. Yields of beans and peppers were monitored each season. Microbial diversity was measured using Biolog EcoPlates, which contain thirty one different media and measure functional diversity. Average Well Color Development (AWCD) and the Shannon diversity index were calculated for each treatment. Comparatively, bacteria from the compost plots showed a greater microbial diversity than the control or the chemically fertilized

plots. Analysis of a subset of the results indicated that the bacteria from the compost plots had a significantly greater diversity of bacteria able to grow on media without nitrogen. Yields of beans and peppers were also significantly higher in the compost plots. **(91)**

Moran*, Deborah, Trevor Cross, Melinda Harrison, and **David Dunbar.** Cabrini College, Radnor, PA 19087. *Mycobacteriophage Marvin: A new singleton phage with an unusual genome organization* - Mycobacteriophages represent a genetically diverse group of viruses that infect mycobacterial hosts. Although more than 80 genomes have been sequenced these still poorly represent the likely diversity of the broader population of phages that can infect the host *Mycobacterium smegmatis* mc^2155. We described here a newly discovered phage, Marvin, which is a singleton phage, having no previously identified close relatives. The 65,100 bp genome contains 107 predicted protein-coding genes arranged in a non-canonical genomic architecture in which a subset of the minor tail protein genes are displaced about 20 kbp from their typical location, situated among non-structural genes anticipated to be expressed early in lytic growth. Marvin is not temperate and stable lysogens cannot be recovered from infections, although the presence of a putative *xis* gene suggests that Marvin could be a relatively recent derivative of a temperate parent. The Marvin genome is replete with novel genes not present in other mycobacteriophage genomes, and although most are of unknown function, the presence of amidoligase and glutamine amidotransferase genes suggests intriguing possibilities for the interactions of Marvin with its mycobacterial hosts. **(188)**

Mulugeta, Surafel, Eric Clark*, Drew Spacht, Gillian Jones, Irfan Haider, and **Steven Mauro.** Mercyhurst University, Erie, PA 16546 - *The active ingredient in anti-depressants can 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 organisms including fish, algae, and crustaceans. However, the impact of fluoxetine on aquatic microbes remain poorly understand. In this study, we examined how fluoxetine influences *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, presumably through bacteriophage induction. 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. **(66)**

Naughten, Patrick*, Maureen A. Levri, and **Edward P. Levri.** Penn State-Altoona, Altoona, PA 16601. *The influence of inflorescence size and number on pollinator visitation and fruit set in mountain laurel (Kalmia latifolia)* – Life-history theory predicts trade-offs between traits that compete for resources. 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 or number of inflorescences on a plant and the probability pollinator visitation and the probability of setting fruit. Twenty-five plants were utilized in the Seminar Forest on the Penn State Altoona campus. Inflorescences and flowers per inflorescence were determined for each plant. Pollinator visitation rates and fruit set were determined for a subset of inflorescences on each plant. A preliminary analysis of the data suggests that increased floral output by a plant results in a lower probability of pollination per flower, and smaller inflorescence size yields a greater probability of fruit production. **(182)**

Nicholson, Charles C.* Morris Arboretum of the University of Pennsylvania, Philadelphia, PA 19118. *Analysis of Local Honey: Foraging Diversity and Colony Fitness in Philadelphia Honeybees (Apis mellifera L.)* - Pollen, as the primary dietary source of proteins, lipids, vitamins and minerals, is essential to the physiological development of adult honey bees (*Apis mellifera* L.). A varied pollen diet is vital to immune system maintenance, organ development, and colony succession via brood production. The reasons for the recent decline in honey bee populations are wide-ranging but include a lack of diverse nectar and pollen sources. Resource deficiency and colony fitness is well understood within natural and agricultural landscapes; few studies have determined the importance of a polyfloral diet for bees existing in areas of intense development. Focusing on honey bees in the city of Philadelphia, we investigated the range of plants utilized as pollen sources and if there are significant colony-level benefits to foraging diversity. We examined the pollen content of honey samples collected from 15 Philadelphia hives from August – October 2011. Late season fitness of colonies was assessed by measuring hive-area covered by brood found in sampled hives. The findings presented here shed light on taxa visited by honey bees in an urban ecosystem. Identification and selection of plants shown to be principal pollen sources can be used to promote effective pollinator restoration programs in developing cities. **(135)**

Niles, Christopher* and **Thomas Murray**. Elizabethtown College, Elizabethtown, PA 17022. *Riparian Buffer Impacts and Stream Temperature Changes in a First Order Pennsylvania Stream*.-The Riparian Buffer and Stream Temperature (RBAST) Project was established to compare the change in stream temperature (D T) along forested reaches with the D T along open reaches at twelve sites across North America as part of the Ecological Research as Education Network. Temperature logging sensors were installed at paired open and forested sites, and the first phase of the project ran from June through October, 2011. We report the results from one of those sites, an unnamed tributary to Conewago Creek near Elizabethtown, PA. Throughout the study period, mean daily stream temperature was higher in the open reach compared

to the forested reach. Contrary to expectations however, the range in mean daily stream temperature was higher in the forested reach, suggesting that variables beyond the canopy cover impact stream temperature. Local climatic conditions (air temperature, relative humidity and PAR) were also collected during the study but have not yet correlated with the water temperatures observed. The project is continuing through October, 2012 and it is anticipated that the long term, continent wide data set will provide more insight into the role of riparian buffers on change in stream temperature. **(151)**

Nole, Kirsten* and **André Walther**. Cedar Crest College, Allentown, PA 18104. *Examination of the role of Replication Protein A phosphorylation in the cellular response to Ultraviolet-induced DNA damage*. -The Nucleotide Excision Repair (NER) pathway in humans as well as in the budding yeast, *Saccharomyces cerevisiae*, repairs DNA damage caused by ultraviolet (UV) light. The highly conserved single-stranded DNA binding Replication protein A (RPA) is required for NER, and is phosphorylated in response to UV damage suggesting a role for RPA phosphorylation in regulating NER. To understand the role of RPA phosphorylation in NER, amino acids that are phosphorylated in RPA were mutated to generate yeast expressing a constitutively unphosphorylated form (rpa-Ala) or to mimic a constitutively phosphorylated form (rpa-Asp). Rpa-asp strains had an increased sensitivity to UV radiation, whereas the rpa-Ala mutant acted like wild type cells. We have systematically combined these RPA phosphorylation mutations with mutant forms of all known NER genes, and identified a number of NER genes that were either suppressed by RPA phosphorylation mutations (*RAD10, RAD14, RAD 16, RAD34*), or synthetically lethal with RPA phosphorylation mutations (*RAD1, RAD7*). The complex genetic interactions among many of the NER genes with RPA indicate a direct role for RPA phosphorylation in regulating UV repair. **(197)**

Opalko, Hannah*, Drew Spacht, Eric Clark, Kyle Lindsay, and **Steven Mauro.** Mercyhurst University, Erie, PA 16546. *The impact of the microcosm on the survivability of Shiga toxin producing E. coli (STEC) in recreational freshwater* - Shiga toxin expressing *E. coli* (STEC) is a pathogenic bacterium that is the causative agent of many cases of human illness in recreational waters. Several labs, including our own, have characterized the distribution and abundance of STEC in The Great Lakes. This work has shown that the presence of STEC in recreational freshwater is not related to fecal indicators that are traditionally used to assess water quality. In this study, we examined the role that total microbe content has on the survival of STEC that was doped into beach water. Our initial findings indicate that removal of all microbes from a water sample dramatically increased STEC survivability in the water to which it has been added. This increased survivability was countered by adding bacterial competitors or protists that graze on STEC. Identification and characterization of how specific microbes alter STEC persistence in recreational freshwater will be presented. **(87)**

Ory, Jeramia, Chelsea Manes*, Harry Pockevich* and **Shannon Ellis.** King's College, Wilke-Barre, PA 18711. *Role of Iron and Copper in Cryptococcal Virulence* – Metal import systems play an essential role in the pathogenicity of *Cryptococcus neoformans*. Cuf1p acts as a primary regulator of the copper import pathway, where it enhances transcription of the copper transporter *CTR4* in response to copper starvation. To test the role of Cuf1p in copper homeostasis, a *CUF1* deletion strain (*cuf1*$^{-}$) was created. The *cuf1*$^{-}$ strain of *C. neoformans* is unable to grow in low copper environments, but viability of the knockout strain is restored to near wild type levels by the addition of extraneous copper. Previous studies demonstrate that the *cuf1*$^{-}$ strain also has an altered cell exterior. As escape of phagocytosis by macrophages is thought to play a role in cryptococcal virulence, we are currently testing phagocytosis of the *cuf1*$^{-}$ strain using a murine model. In addition, bioinformatic analysis of the upstream sequences of genes differentially regulated between wild type and *cuf1*$^{-}$ strains shows that few of the genes (besides *CTR4*) contain a typical fungal copper regulatory element. Upstream analysis of *CTR4* shows that it contains not only copper regulatory elements, but iron regulatory elements as well. We are currently exploring the role that differing concentrations of iron may have on *CTR4* expression using RT-PCR. **(41)**

Ory, Jeramia, Kathryn Phillips*, Christina Marvin*, Richard Kliman and **Erin McClelland.** King's College, Wilke-Barre, PA 18711. *Genetic Determinants of Virulence in the Fungal Pathogen Cryptococcus neoformans* – *Cryptococcus neoformans* is an opportunistic fungal pathogen that is found in soil around the world. It infects immunocompromised individuals, usually HIV or AIDS patients or individuals receiving immune suppressing drugs. Microarray analysis of strains of *C. neoformans* isolated from AIDS patients in Botswana was carried out to examine whole genome expression with the hope of correlating patient outcomes with gene expression. Genes that are differentially regulated in regards to host mortality rate, host gender, and host white blood cell count in the cerebral spinal fluid have been found using Significance Analysis of Microarray (SAM) and cluster analysis. To probe further genetic determinants of virulence in *C. neoformans*, whole genome sequences of twelve strains of *C. neoformans* has been collected using SOLiD4. Eight strains were collected from the environment, while four strains were isolated from AIDS patients, part of the larger set studied via

microarray analysis. We are currently assembling the whole genome data reads, focusing on the sequence of common virulence factor genes. Variation between the strains will inform the larger assembly effort, and guide analysis of less conserved regions of the genome. **(40)**

Oswald, Kaitlin A.*, Kristen A. Sigley*, and **Audrey J. Ettinger.** Crest College, Allentown, PA 18104. *Investigating the Effects of Social Behavior on Somatostatin and Gonadotropin Releasing Hormone Neurons in the Cichlid Fish Brain*--The causal relationship between behavior and physiology has been studied in many species. Cichlid fish have been utilized as a model organism to elucidate the behavior-physiology relationship due to their aggressive behavior and highly plastic social status. The hormones Somatostatin (SST) and Gonadotropin releasing hormone (GnRH) are regulated in response to behavior in some species. SST is a growth-rate regulator, while GnRH regulates the release of hormones responsible for reproduction. Here, we have begun to test the relationship between the social status of the cichlid fish *Rocio octofasciata* and the size of SST and GnRH-containing neurons. We have established behaviorally dominant and subordinate pairings of fish in order to compare the sizes of SST and GnRH neurons in dominant and submissive males and females. We predict that regardless of sex, socially dominant fish will have larger SST neuron sizes, correlated with low growth rates. They will also possess larger GnRH neurons and gonads containing reproductively viable testes or eggs. The results of this work will contribute to a better understanding of the ways in which behavior can shape the brain. **(113)**

Pacheco, Brianna* and **Marianne Staretz.** Cedar Crest College, Allentown, PA 18104. *Examination of the Change in Fluorescence of Semen Stains with Time* - According to the World Health Organization "the true extent of sexual violence is unknown". Detection of semen is an essential component in many sexual assault cases. Initial detection of semen stains is often done by looking at the fluorescence emitted by the stain when irradiated by a light source of a specific wavelength. Currently it is unknown if time, fabric type, and/or the source of semen have an effect on the identification of semen stains. The current study analyzed the effects of time, fabric type, and source of semen on the detection of semen stains using forensic light sources. The three fabrics used were 100% light cotton, 100% denim, and 83% Nylon/17% spandex. The stains were documented using digital photography. The intensity of the fluorescence of the stains was quantified using a digital process program ImageJ. The results of these analyses will be presented. **(78)**

Parker, Michael*, Yuan Zhong*, Xinbin Dai, Patrick Zhao and **Shiliang Wang**. Millersville University, Millersville, PA 17551. *Terpene Synthase Gene Family in Medicago truncatula* and *Arabidopsis thaliana: Genome-wide Identification, Organization, Expression and Phylogenetics.* Terpene synthases (TPS) synthesize the largest class of natural products, terpenes, which are important for the growth and environmental interaction of plants and are used extensively in manufacturing medicines, pesticides, perfumes, and essential oils. A timely genome-wide analysis and comparison of the TPS gene family was conducted in glandular trichome-bearing *Medicago truncatula* and non-glandular trichome-bearing *Arabidopsis thaliana*. This comprehensive in silico analysis identified 33 (3 new candidates) and 23 (17 new candidates) full length TPS genes in *Medicago* and *Arabidopsis*, respectively, and our results suggest that the TPS have progressed through extensive duplication and paralog events in Arabidopsis, but through only duplication events in Medicago. Conserved domain analysis reveals that Subfamilies A and G of the TPS contain exceptional variation in these motifs, suggesting a continuing process of evolutionary variation. Expression pattern analysis suggests that in both species most TPS genes play functional roles in multiple tissues, but tissue-specific expression of TPS genes does occur in several tissue types including trichomes. These results provide novel insights into the function, evolution and relatedness of TPS and could lead to increased biomedical and agricultural production, enhanced environmental protection, and improved safety of transgenic crops through trichome-specific genetic engineering. **(96)**

Pattison, Amanda*, Molly McQuilken, and **André P. Walther**. Cedar Crest College, Allentown, PA 18104. *Analysis of the Role of Replication Protein A Phosphorylation on Telomere Length in the budding yeast Saccharomyces cerevisiae* – In humans, telomeres are the structures at the tips of linear chromosomes that act as buffers to prevent the loss of genetic information during DNA replication. The budding yeast, *Saccharomyces cerevisiae* have telomeres that are functionally and structurally very similar to human telomeres making it a powerful model organism. We focused on the role of the highly conserved single stranded DNA protein Replication Protein A (RPA), known for its role in telomere synthesis. RPA consists of subunits *RFA1*, *RFA2*, and *RFA3*, and the second subunit (*RFA2*) is phosphorylated in a cell cycle dependent manner suggesting a possible role in telomere synthesis. 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 are identifying the genetic requirements for these phenotypes through mutations of known telomere genes in conjunction with these RPA mutant strains and examining telomere length using Telomere Restriction Fragment Southern analysis. We have shown that the telomere maintenance genes *KU70* and *TEL*1 genetically interact with RPA phosphorylation mutations, and are examining the genetic interactions of RPA with additional telomere synthesis genes. **(33)**

Pham, Melinda* and **Frank Dorman**. Pennsylvania State University, University Park, PA 16801. *Environmental Forensic Investigation of Source of Organic Contaminants in Stream Water and Sediment* - Modern society has increased the quantities and varieties of organic compounds for their positive benefits, however there is a negative side –environmental exposure. The "contaminant" may be transported great distances through the ecosystem before detection. In addition, the compounds may undergo significant degregation. This may make the identification of the source of the pollution more difficult. It is the identification, quantification, and determination of the source(s) of environmental pollution that largely comprise the science of environmental forensics, and the subject of this presentation. The organic contaminants of interest in this study are phenols and persistent organic pollutants (POPs) like polycyclic aromatic hydrocarbons (PAHs). In this study, water and sediment samples from a nationally recognized sport fishing stream were analyzed for a wide variety organic contaminants. It was initially assumed to be as a result of a documented release of organochlorine pesticides into the watershed. Upon evaluation of the initial samples, however, it became apparent that there was at least one unknown source of additional contamination unrelated to the documented release of the pesticide. Contaminants of interest were extracted from the stream water and sediment samples and analyzed via Gas Chromatography – Mass Spectrometry (GC-MS) was for both qualitative and quantitative analysis. **(195)**

Phillips, Erin*, and **Jacqueline A. Speir,** Cedar Crest College, Allentown, PA, 18014. *Dispersion Staining and the Christiansen Effect as a Means of Detecting Heat-Induced Changes in Glass Refractive Index* - Refractive index, density and elemental composition are typical parameters used to identify and compare forensic glass samples. Although there is some degree of correlation between these variables, a single glass sample can exhibit a noticeable change in refractive index depending upon variations in thermal history. As such, the positive association of questioned and exemplar glass sample typically includes an evaluation of heat-induced changes in refractive index (which can be especially important in arson-related crimes). In such an investigation, the greatest accuracy and precision is achieved if the analyst employs semi-automated techniques that rely on the use of phase contrast. If related instrumentation is unavailable, analysts must employ low-cost alternatives such as dispersion staining and the evaluation of Christiansen colors. The research presented here evaluates the utility of dispersion staining and the Christiansen effect as a means of detecting heat-induced (~750°C) changes in the refractive index of optical and bottle glass samples, including an assessment of the impact of cooling models. Comparisons of heated glass samples with variable cooling mechanisms indicate that heat-induced changes in refractive index are both significant (using Welch's modification of the t-test), and detectable using dispersion staining and Christiansen colors. **(77)**

Pierce, Diana H.* and **Angela R. Hess.** Bloomsburg University Bloomsburg PA. *Eph receptor and ephrin ligand expression in human keratinocytes, melanocytes and melanoma cell lines.* -- The largest family of RTKs, the Ephs and their ephrin ligands, are involved in many physiological processes including angiogenesis, cell proliferation and motility. Eph/ephrins have been implicated in the development of various cancers arising in lung, ovarian, colon, and prostate tissue. Although Eph/ephrin expression and function in various organ systems is well documented, little is understood regarding their function in skin. Within the epidermis, contact dependent signaling facilitates a symbiotic relationship between keratinocytes and melanocytes. Expression profiles for Eph/ephrins have been established for keratinocytes but are lacking for melanocytes. Recent studies demonstrate variation in Eph/ephrin expression in melanoma which may contribute to the development and progression of this disease. The aim of this study was to establish an Eph/ephrin expression profile in keratinocytes and melanocytes and compare that profile to a variety of melanoma tumor lines derived from patient tissue. PCR data confirmed the expression of EphB2, ephrin-B1, and ephrin-B3 in keratinocytes. Comparatively ephrin-B1 and ephrin-B3 expression was identified as novel ephrins in melanocytes. Moreover, PCR confirmed varied expression of ephrin-B1, ephrin-B3, and EphB2 across a panel of melanoma cell lines. Future studies are aimed at understanding how changes in Eph/ephrin expression contribute to the development of melanoma. **(12)**

Polzella, Marie* and **Staretz, Marianne.** Cedar Crest College, Allentown, PA 18104. *Analysis of the Binding of Benzodiazepines to Human Serum Albumin using Rapid Equilibrium Dialysis.* Human Serum Albumin (HSA) is the most abundant protein in the blood accounting for 60% of total plasma protein. It has several important functions one of which is to serve as a transport protein for a variety of endogenous and exogenous compounds such as drugs. The binding of drugs to HSA can influence the distribution as well as rate of metabolism and excretion of the drugs. Benzodiazepines are a class of drugs that have been shown to bind to HSA. The goal of the current study was to investigate the interaction of HSA and various benzodiazepines. Alprazolam, diazepam, flurazepam, lorazepam, nordiazepam, and oxazepam were the benzodiazepines used in the current study. Rapid equilibrium dialysis (RED) was used to examine the binding between albumin and the drugs. The benzodiazepines in the analyzed samples were quantitated using LC/MS/MS The binding constants for the benzodiazepines were determined and compared. The results of these analyses will be presented. **(53)**

Prischak, Brittany* and **J. Michael Campbell.** Mercyhurst University, Erie, PA. *Responding to Climate Change: a project-centered course to advance climate action planning in the university* – A new course was developed to involve students in updating Mercyhurst's campus greenhouse gas emissions inventory and Climate Action Plan (CAP). Students were organized in small groups to perform data entry into a new carbon accounting software system (Mosaic). The groups also contributed to a report comparing current and past emissions and evaluating progress toward the goal of achieving carbon neutrality by 2030. Students carried out an independent project to expand or improve inventory data or plan a specific student-centered or university action to reduce campus emissions. At the conclusion of the course, the students presented their findings and plans to a gathering of university administrators and community/business leaders. Lessons learned from the trial run of the course and plans in progress to improve the continuity and advancement of student-initiated sustainability projects will be outlined. **(70)**

Quinlan, Ian * and **Ahmed Lachhab**. Susquehanna University, Selinsgrove, PA 17870. *Tracking Ground Water Level Using Seismic Refraction, GPR, Water Level Transducer and a Laboratory Model* – Seismic refraction and Ground-Penetrating radar (GPR) were applied to track water table fluctuations and compared to ground water level from five newly drilled monitoring wells at the Center for Environmental Education and Research (CEER) near Susquehanna University. Two sets of seismic refraction surveys were performed; one to evaluate water levels, and the second to evaluate the local geology of the site. GPR was used as a comparative method to better assess the water table. Both seismic refraction and GPR results showed identical result yet compared to water level in the monitoring wells along the survey line were slightly off. A laboratory model was constructed to verify where the geophysical reading is performed and a detailed examination of well log Stratigraphy and the integration of all applied methods show that monitoring wells are being influenced by the lower region where the well screen is placed. This region has relatively higher hydraulic conductivity allowing water to flow more rapidly and causes water to rise in the observation wells above the surrounding water level detected by geophysical methods. A calibration equation linking potentiometric level to the water table was also performed. **(149)**

Ramdaney, Aarti*, and **K. Joy Karnas**. Cedar Crest College, Allentown, PA 18104. *Environmental Heavy Metal Detection Using the Molecular Responses of Flora and Fauna*– Organisms are constantly challenged with environmental stressors as they come in contact with naturally occurring chemicals, environmental pollutants, and infectious agents. Specific forms of contaminants, such as heavy metals, are introduced into the environment through power stations, heating systems, and urban traffic. Though most heavy metals are essential to normal growth and development, excess exposure can have detrimental effects as seen in recent reports regarding the high levels of heavy metal pollution in China. The goal of this study was to investigate the molecular response of flora and fauna to heavy metal pollution using a Solanaceae family member, *Solanum lycopersicum* (common tomato plant), and a known Solanaceae consumer, *Manduca sexta* (tobacco hornworm). cDNA microarrays allowed for the identification of specific responsive genes in *S. lycopersicum*, including metallothionein and calcineurin B. qPCR enabled the correlation between the level of expression of these selected genes as well as housekeeping and heat shock genes in comparison to the amount of heavy metal present for both *S. lycopersicum* and *M. sexta*. The correlation between increased expression of genes, such as hsp70, and elevated levels of zinc may allow scientists to use these types of genetic markers in the future to monitor the environment. **(130)**

Redding[1], Stephen, Jordan Krawitz[1], Sarwar Hashmi[2], Randy Gaugler[3] and **Christopher W. Brey[1]*.** Marywood University, Scranton PA 18509[1], Lindsley F. Kimball Research Institute, New York Blood Center, New York, NY 10065[2], Rutgers University, Center for Vector Biology, New Brunswick NJ 08901[3] - *Characterization of the transcriptional regulatory fat gene, klf-3 in Caenorhabditis elegans.* The results of this study are part of a multi institutional collaboration in which the goal is to understand how fat is regulated and stored in higher eukaryotic systems. To understand the mechanism we study *Caenorhabditis elegans* Krüppel-like transcription factor, *Ce-klf-3*. The profound effect of *klf-3* mutation on the accumulation of fat suggests that *klf-3* functions to limit fat storage and plays a part in its mobilization to other tissues. When *Ce-klf-3* is blocked an abnormal high amount of fat is produced strongly indicating that *Ce-klf-*3 acts as a negative regulator during fat metabolism. To understand the role of *Ce-klf-3* plays during the fat metabolic process we employ the technique of DNA transgenesis using *C. elegans* and rescue assays to characterize *Ce-klf-3 in vivo*. Briefly, experiments are under way to test whether the *klf-3* loss of function (ok1975) mutant can be rescued with over-expressed lipid transport genes *vit-5* and *dsc-4*, the mammalian homologs of apoB and MTP. If resulting offspring are rescued this suggests that the mobilization of lipids are disturbed in the *klf-3* mutant, and subsequently may explain *klf-3* role in the fat metabolic pathway. We will present our results at the meeting. **(44)**

Reeder, DeeAnn *, Marianne Moore, Gregory Turner, Laura Grieneisen, Sarah Brownlee, Morgan Furze, Sarah Brownlee, Chelsey Musante, Megan Vodzak, and **Kenneth Field**. Bucknell University, Lewisburg, PA, 17837. *Susceptibility and Physiology of Bats with White-nose Syndrome: Lessons from Pennsylvania* — White nose syndrome has recently been demonstrated to be caused by the fungus *Geomyces destructans* (Gd), which colonizes and invades the skin of hibernating bats. A number of physiological changes occur in affected bats, including a dramatic rise in the num-

ber of arousals from hibernation. The frequency of arousals predicts 60% of the variance in death date due to WNS and is significantly correlated with the degree of fungal invasion of the wings. These increased arousals appear to cause death in a way that is not directly related to body mass. Differences in species and individual susceptibility are likely caused by life history differences such as body size, time in hibernation, and microclimate preference and by physiological differences such as immune competence and differences in thermoregulatory behavior. We have shown that WNS affected bats hibernating at colder temperatures survive significantly longer than those hibernating at warmer temperatures. Current studies are examining species differences in susceptibility and in the immunological response to WNS using naïve animals from outside the WNS zone that have been inoculated with Gd. Future studies will focus on the physiology and behavior of survivors. **(10)**

Reenstra, Danielle* and **David Singleton**. York College of Pennsylvania, York, PA 17403. *The Interferon Response to Epstein-Barr Virus* - Epstein-Barr Virus (EBV) of the Herpesviridae family, causes chronic infection in approximately 90% of the world population and is associated with cancer and autoimmunity. The purpose of this study was to determine the cell types producing a type I interferon (IFN-α and IFN-β) response to EBV. Type I IFN is highly important for inducing antiviral immune responses. Peripheral blood mononuclear cell (PBMC) samples from healthy individuals were depleted of plasmacytoid dendritic cells (pDC) and/or monocytes. Samples were then stimulated with EBV or control stimuli and left to incubate. The interferon regulated genes (IRG) of each sample were measured via quantitative real-time PCR (qrtPCR). Preliminary data showed pDC and monocyte depletions had minimal effect on IRG expression. These results suggest that while pDCs and monocytes may lead to an IFN response, there are likely other cells involved, such as B cells. **(48)**

Resnick, Shoval*, **André P. Walther**, and **Marianne Staretz.** Cedar Crest College, Allentown, PA 18104. *The Use of p-XSC as a Chemopreventative Agent in Saccharomyces cerevisiae* - Selenium is an essential trace element that is required for the proper function of a number of crucial proteins and enzymes in the human body, possibly due to its antioxidant properties. At supra-nutritional, but non-toxic levels, selenium is linked to decreased cancer incidence. The selenium containing molecule 1,4-phenylenebis(methylene) selenocyanate (p-XSC) has been shown to reduce animal tumors, and it plays a role in cell cycle control and cell proliferation. We have used *Saccharomyces cerevisiae* as a model system to understand p-XSC's chemo-preventative properties in humans. Our initial studies determined that the highest non-toxic dose of p-XSC in yeast is 100 nanomolar, which is comparable to human cells. Yeast cells were then pre-treated with p-XSC at 100 nanomolar, and then changes in cellular viability were measured in cells that contained methylated DNA damage caused by an LD50 dose N-nitroso-N-methyl urea (MNU) of 30 millimolar. Initial results indicate an increased viability in the p-XSC treated cells in response to MNU suggesting a protection against DNA methlyation. **(27)**

Rhodes, Ciera[1*], Bassem Allam[2], Laura F. Altfeld[1], and **Brad E. Engle[1].** [1]Wilson College, Chambersburg, PA 17201, [2]Stony Brook University, Stony Brook, NY 11794. *Effects of 17α-ethinyl estradiol on hard clam (Mercenaria mercenaria) immunity and QPX (Quahog Parasite Unknown) Infection* - Quahog Parasite Unknown (QPX) is a protistan parasite of hard clams, *M. mercenaria*, and has caused significant mortality of wild and cultured clams in northeastern United States. The QPX organism does not typically cause disease until there is an extreme environmental stress that reduces the ability of clams to fight infection. This study was designed to investigate the effects of synthetic estrogen, 17α-ethynyl estradiol, on QPX-induced immune responses in *M. mercenaria.* Clams were separated into 4 groups: control, estrogen (125 ng/L), QPX (New York strain, 8BC7), and estrogen/QPX, and were maintained at 18°C for 2 months. QPX- specific cell- mediated and humoral defense parameters were assessed after 1 and 2 months. Measured parameters included total and differential hemocyte counts (flow cytometry), reactive oxygen species (ROS) production (NBT colorimetric assay), phagocytosis activity (fluorescent bead assay), and lysozyme activity and protein concentration in plasma (spectrophotometric assay; BCA protein assay). Preliminary results demonstrated a decrease in immune function, with the estrogen/QPX group showing the greatest decrease in granulocytes. Phagocytosis, ROS, and lysozome activity and protein concentration are currently being analyzed. Decreases in all immune parameters are expected demonstrating the immune-suppressive activities of synthetic estrogen and QPX parasitism. **(143)**

Rhone, Abby N* and **Cristen L. Rosch.** Kutztown University, Kutztown, PA. 19530. *The Effects of Acetaminophen on Chick Development and the Expression of Glutathione-S-Transferase Gene* -Acetaminophen is the active ingredient found in many over-the-counter medications. A pregnant woman taking acetaminophen to relieve back or body aches may unknowingly be causing detrimental damage to herself and her fetus. Exposure to acetaminophen *in utero* has also been shown to predispose an infant to asthma by causing polymorphisms in the glutathione-S-transferase (GST) gene family, the enzyme responsible for glutathione regulation. This experiment was designed to test the effects of different concentrations of acetaminophen on chick embryo development and GST gene expression. The study specifically focused on acetaminophen's effect on body size, head size, and external morphology. Forty-eight hour chick eggs were injected with four different doses of acetaminophen as well as a Ringer's saline control solution. The embryos were then examined after a two week incubation period. The doses

of acetaminophen included 0.5 mg/mL, 1.5 mg/mL, 5.0 mg/mL, 7.0 mg/mL. The mRNA of the GST gene was isolated using Reverse Transcriptase Polymerase Chain Reaction and the amplicons visualized using DNA gel electrophoresis. Higher doses of acetaminophen will be expected to cause greater developmental defects and under-expression of the GST gene. **(61)**

Richardson, Hannah*[1] Alicia Helfrick[2], and Theo Light[2]. [1]Shippensburg Area High School, [2]Shippensburg University, Shippensburg, PA 17257. *Diet and behavior of Appalachian brook crayfish in acidic and neutral pH mountain streams* – Appalachian brook crayfish *(Cambarus bartonii)* are abundant in most higher-elevation streams in south-central Pennsylvania, including many affected by acid precipitation. These acidified streams (pH < 5.0) typically do not support fish, though brook trout are often present in downstream, less acidic, reaches of the same streams. We hypothesized that the absence of trout might lead to changes in crayfish diets and activity levels, due to reduced competition and predation. To test this idea we sampled and observed crayfish in 13 sites in 10 upper elevation (>300 m) streams, seven acidic (pH < 4.8) and fishless, and six circumneutral (pH > 6.2) and containing at least some fish. Crayfish densities were greater, and daytime activity levels non-significantly higher, in the acidic, fishless sites than the neutral sites. We also collected potential crayfish food sources (benthic invertebrates, algae, aquatic mosses and liverworts, and detritus) in each stream, and prepared these, and crayfish muscle tissue, for stable isotope analyses. Crayfish had a significantly higher trophic position in acidic than neutral streams, indicating greater use of animal food. The carbon source for crayfish appears to be mainly algae and terrestrial detritus (rather than the abundant mosses and liverworts), possibly with some contribution of terrestrial invertebrates. **(159)**

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 0.05-0.07 mg/kg/day At these levels, there can be a beneficial effect on the prevention of dental caries and remineralization. Higher levels, however, can lead to dental fluorosis. It is estimated that 32% of American children have some form of fluorosis with 2-4% children having moderate to severe stages. Exposure to fluoride can be due to beverages, food, dietary supplements, and toothpaste containing high levels fluoride ions. This project focuses on examining the concentration of fluoride ions found in beverages commonly consumed by children. The results of these analyses will be presented. High levels of fluoride in some beverages can lead to excessive exposure to fluoride in children especially if diets are supplemented with fluoride. To assist in preventing dental fluorosis, parents and medical/dental practioners need to be made aware of any beverages that may expose children to fluoride levels which may put them at risk for developing dental fluorosis. **(103)**

Rittle, Rebecca* and **Tammy Tobin.** Susquehanna University, Selinsgrove, PA 17870. *Identification of Ammonia-Oxidizing Bacteria in Soils Overlying the Coalmine Fire in Centralia, Pennsylvania* - The coalmine fire in Centralia, Pennsylvania is known to generate high levels of ammonium and nitrate. Previous PCR-based studies in our lab have documented the presence of ammonia-oxidizing bacteria in the coalmine fire-impacted soils. In order to identify these ammonia-oxidizing species, soil samples were collected from fire-impacted soils that ranged from 49°C to 69°C. DNA was isolated from the soil, purified, and analyzed via PCR using primers targeting the 16S rRNA gene and the ammonia monooxygenase A (AmoA) gene. Once the AmoA gene is amplified, sequencing will be performed to identify the types of ammonia-oxidizing bacteria found in the soil. Soil samples from Centralia were also added to *Nitrosomonas europaea* medium and cultured at 55°C in order to try to isolate new species of thermophilic ammonia-oxidizing bacteria. The growth from these cultures is currently being used to isolate individual colonies that can be used for culture-based and genetic identification. **(89)**

Ritz, Amanda*, Heather Sahli, David Biddinger, James Schupp, Edwin Winzler, Ed Rajotte, and **Neelendra Joshi.** Shippensburg University, Shippensburg, PA 17257, Penn State Fruit Research and Extension Center, Biglerville, PA 17301, Penn State University, State College, PA 16802. *Quantifying the Efficacy of Native Bees for Orchard Pollination in Pennsylvania to Offset the Increased Cost and Decreased Reliability of Honeybees* – The results of this study are part of an ongoing project to determine the effectiveness of non-*Apis* bee species as alternative pollinators of apples. We examined how distance from native bee habitat influenced visitation rates to flowers, fruit weight, and number of seeds per fruit in six commercial orchards in Biglerville, PA. Of the six orchards sampled only the orchard containing Honey Crisp appeared to be pollinator limited in orchard interiors as indicated by a significant decrease (p=0.001) in the mean number of seeds per fruit as distance from bee habitat increased. The five remaining orchards, containing Golden Delicious, Ultra Gold, and York, showed no decline in fruit or seed production at increasing distance from native bee habitat. Timed counts of bee visits demonstrated that feral honeybees were present throughout all the orchards with the exception of the Honey Crisp block and may account for the lack of decrease in seed production with increasing distance from native bee habitat in most of the orchards. Additionally, carbohydrate stress brought on by cloudy early season weather may also be a contributing factor influencing fruit yield as indicated by >7 fruit/cm^2 for all sites and cultivars. **(134)**

Rivera, Natasha [1*], Sunshine Overturf[1*], Ary Farajollahi[2], Randy Gaugler[2] and **Christopher W. Brey[1].** Marywood University**,** Scranton PA 18509[1]. Rutgers University, New Brunswick NJ 08901[2]. *Detection of Dirofilaria immitis (Nematoda: Filarioidea) by Polymerase Chain Reaction in the Asian Tiger Mosquito* (ATM), *Aedes albopictus, from northern New Jersey.* - *Dirofilaria Immittis*, Dog Heartworm (DHW) is a devastating nematode parasite of domestic dogs and cats. *Aedes albopictus,* the Asian Tiger mosquito (ATM) is one of the primary vectors of this parasite. The ATM has been found in 866 counties in 26 states in the continental U.S., residing mostly in the southeastern region of the U.S. It is unclear what effect the presence of this mosquito species might have on transmission dynamics of DHW in the Northeastern US. The results of this study are part of a continuing collaboration with the Center for Vector Biology at Rutgers University to determine the incidence of dog heartworm in field collected *Aedes albopictus* from Mercer Co. New Jersey. The presence of *D. immitis* in pooled populations of *A. albopictus* are currently being tested by polymerase chain reaction using species-specifc primers for the *D. immitis* cuticular antigen. So far, approximately 250 ATM mosquitoes comprising twenty pools (5 to 25 individual ATM mosquitoes per pool) have tested negative for *D. immitis.* We are currently testing an additional 1,000 ATM mosquitoes and will present our results at the meeting. **(166)**

Roberts, Rebecca and **Samantha Simpson*** Ursinus College, Collegeville, PA 19426. *Effects of Estrogen and the BPA on Cathepsin Activity and its Connection to the autoimmune disease Systemic Lupus Erythematosus* - Systemic lupus erythematosus (SLE) is an autoimmune disease characterized by the over production of self antibodies and results in many symptoms from general malaise to blood clots, renal failure, and heart disease. SLE primarily affects women between the ages of 10 and 50; its progression often corresponds to the years in which estrogen levels are highest within the body. Populations associated with low socio-economic status are also highly affected; interestingly these populations are commonly exposed to the environmental estrogen, bisphenol A (BPA), which is a component of many polymers. Within the immune system, lysosomal digestion proteins, cathepsins, degrade pathogen proteins; these peptide fragments are delivered to the Major-histocompabitibility complex molecules (MHC-II) on antigen presenting cells (APCs). MHC-II on the surface of APCs present fragments to helper T-cells that have roles in regulating the immune response and production of antibodies by B-cells. Estrogen, a signal molecule, regulates transcription in antigen presenting cells (APCs). We hypothesize that Estrogen and BPA may modify the cathepsin activity and the presentation or processing of antigens on the MHC II. We've shown that certain cathepsins are regulated by estrogen and bisphenol A, and that this regulation is mouse-strain specific. **(52)**

Robinson, Ellen* and **Fredrick R. Hofsaess**, Delaware Valley College, Doylestown, PA 18901. *The effect of lower pH in Turkey Extender buffer solution used in turkey artificial insemination on male to female poultry ratio* -The focus of this experiment is the male:female ratio of turkey poults hatched from eggs fertilized by Artificial Insemination (A. I.) using an extender solution at a lower pH of 6-6.2 than the standard used commonly in the commercial turkey industry. This is in the range to maintain viable spermatozoa for insemination. The lower pH group as compared to a control group inseminated using Beltsville turkey semen extender which is a standard commercial turkey extender of pH 6.5. Many studies have been conducted on the pH of buffer solutions and the effects on stored semen and fertility. However none have been done with reference to the sex of the poults produced. The findings of this experiment could have potential financial effects on the poultry industry. **(108)**

Rocco, Sarah* and **Melinda Harrison** Cabrini College, Radnor, PA 19087. *Observing the Expression of Chlamydomonas reinhardtii Proteins when exposed to Various Concentrations of Selenium*- Selenium is an essential trace element for the wellbeing and development of several organisms, from algae to humans. It plays a vital role in the formation of selenoproteins which function in the protective processes from oxidative stress. However, an overdose may cause selenium poisoning and result in defects for human health. The purpose of this experiment is to find proteins whose expression is elevated upon addition of selenium to the cells of *Chlamydomonas reinhardtii*. This was done by first exposing liquid cultures of *C. reinhardtii* to various concentrations of selenate and selenite then observing their growth rate by counting cells daily with a hemocytometer. Previous experiments of this lab revealed that the optimal level of selenate for *C. reinhardtii* was 35µM while the toxic level was between 50µM and 100µM. These samples were then studied further, where the cells were swelled and burst open with the use of a sonicator. The samples were then studied for protein expression using SDS-PAGE. **(26)**

Ronca, Shannon E.* and **Alan B. Hale.** Cedar Crest College, Allentown, PA 18104. *Phage Burst Size: Eliminating Error and False Assumptions.*- Bacteriophages are viruses that infect and lyse bacteria and can be used as a self-replicating treatment for infections in a process known as phage therapy. Burst size, the number of new phage produced per host infection, is an important parameter associated with phage therapy. Unfortunately, current methods used to estimate burst size yield a high degree of variance in the data and are based on false assumptions that could significantly underestimate the actual burst size. The goal of this project was to develop an approach that addresses these concerns. The method involves the use of real-time, bacterial growth curves and refined dilution series in the presence of phage. Data derived from this approach indicate that the average burst size of coliphage, CφSL1, is 580 phage/host cell with

a CV of 5.6%. In contrast, using the traditional plaque assay method, the estimated average burst size is 160 phage/host cell with a CV of 18.6%. Not only does having more precise and accurate estimates of burst size facilitate the design of specific phage therapies, it also allows more refined experiments that can help scientists address quantitative aspects of the host-phage relationship. **(191)**

Rounsville Jr., Thomas F.*, and **Jane Huffman.** East Stroudsburg University, East Stroudsburg, PA 18301. *An Evaluation of the Gentic Diversity of the Bobcats (Lynx rufus) of Pennsylvania, New Jersey, and Wisconsin* — The focus of this study was to elucidate the relationship of genetic diversity between the bobcats (*Lynx rufus*) of Pennsylvania and New Jersey to samples taken from wild bobcats residing in the state of Wisconsin. Utilizing microsatellite DNA analysis of six microsatellite loci, genotypic profiles were established for twenty-nine individual Wisconsin bobcats from which tissue samples had been taken. These genotypic profiles were then analyzed against the results of a previous study on the population genetics of Pennsylvania's and New Jersey's bobcats. A direct comparison of the genetic diversity between the two distinctly separate populations allows for a greater understanding of the viability and the events shaping the bobcat populations of our area. This information, in turn, is then invaluable to management decisions, ensuring the longevity of the species in both Pennsylvania and New Jersey. **(94)**

Russell, Ashley L.* and **Darlene S. Melchitzky.** Mercyhurst University, Erie, PA 16546. *Hypothalamic innervation of the mediodorsal thalamus in macaque monkey: Location of projection neurons* - Subcortical inputs to the prefrontal cortex (PFC) are provided by the mediodorsal nucleus of the thalamus (MD). To understand the function of this connection, knowledge of the subcortical inputs to the MD is required. In this study projections from the hypothalamus to the MD were studied. Injections of the retrograde tracer cholera toxin b subunit (CTb) were made into seven hemispheres of the dorsolateral area of the MD of the macaque monkey. Drawings of CTb- immunoreactive cells in the hypothalamus were made using a camera lucida drawing tube attached to a microscope. Initial analyses have shown labeled cells in numerous hypothalamic nuclei, including the anterior, lateral, arcuate, dorsomedial, paraventricular, perifornical, ventromedial and lateral tuberal nuclei. These findings suggest that autonomic and homeostatic information from the hypothalamus is relayed to the PFC via the MD. Future studies to determine the chemical identity of these projection neurons are planned, thereby further elucidating the role of hypothalamic input to the central executive functions of the PFC. **(72)**

Sahli, Heather F.*, Alicia Helfrick, Nathan Weber, and **Jaclyn Braund**. Shippensburg University, Shippensburg, PA 17257. -*Effects of logging on plant reproduction and pollinator communities in south central Pennsylvania* --Timber harvest is a regular disturbance in many of Pennsylvania's forests, yet the effect of timber harvest on understory plant reproduction and pollinators has been little studied. We located three sites in Michaux State Forest that had been logged within the last 15-20 years and three sites that had not been logged for over 100 years. We compared visitation rates to flowers of several understory plant species at each site to determine if logging had an effect on pollinator visitation. In addition, we tested whether plant reproduction to mountain laurel *(Kalmia latifolia)* and striped wintergreen (*Chimaphila maculata*) was limited by pollinators and whether the degree of pollinator limitation differed across logged and unlogged sites. Finally, we compared abundance and diversity of the pollinator community at each site using sweep netting at flowers as well as pan traps. Results from this study not only provide information on the important pollinators in forests in south central Pennsylvania, but also provide information useful for forest managers interested in maintaining native plant and animal diversity. **(133)**

Scavo, Gia*, Christopher Lehman, Kenneth Pidcock, and **William J. Biggers.** Wilkes University, Wilkes-Barre, PA 18766. *Stimulation of Settlement and Metamorphosis of Larvae of Capitella teleta by Marine Algae and Bacteria* -Many species of marine invertebrate larvae have been demonstrated to settle and metamorphose into juveniles in response to different bacteria, diatoms, and algae found in the marine environment. These natural settlement cues serve an important role in habitat selection by the larvae and therefore also in the recruitment and population dynamics of these species. We have begun investigations into whether or not larvae of the marine polychaete annelid *Capitella teleta* also are stimulated to settle and metamorphose in response to marine bacteria and algae. Our laboratory results indicate that these larvae do settle and metamorphose in response to the algal species *Nannochloropsis, Isochyrsis,* and *Tetraselmis* as well as three unidentified aerobic bacterial species isolated from marine sediments. Settlement and metamorphosis in response to these algae and bacteria however occurred only after several days. These results provide evidence that bacteria and/or algae, or possibly their breakdown products, present in marine sediments may serve as settlement cues for habitat selection by larvae of *C. teleta*. **(165)**

Schaller, Victoria*, **M. Kitchens-Kintz.**, East Stroudsburg University, East Stroudsburg, PA 18301. *Analysis of the microbial composition within the rhizosphere of the Common Reed (Phragmites australis) at varying stages of invasion* - A Eurasian strain of *Phragmites australis* is quickly establishing itself along riparian areas in the Northeast. Previous studies have suggested that it produces higher levels of Gallic acid in the rhizophere, which can change the composi-

tion of the microbial community and suppress the growth of other bacteria and native flora. The purpose of this project is to identify changes within microbial assemblages of soil in the rhizosphere of the Eurasion *Phragmites australis* over a course of one growing season along the Brodhead Creek in East Stroudsburg, PA. using four objectives: (1) Identification of the study area via ArcGIS to determine areas with similar soil composition, and hydrology containing *P. australis*, (2) Perform DNA analyses to verify the lineage as the non-native Eurasian strain, (3) determine the invasion status within the study area using the Releve method, and (4) Perform a terminal restriction fragment length polymorphism (T-RFLP) using the bacterial 16S rRNA gene to determine the bacterial community lineages present within each site. This research will provide information regarding the changes that occur within soil bacterial communities during an invasion of *P. australis*, and aid in the understanding of what steps must be taken for effective restoration projects. **(131)**

Schwab, Jennifer L.*, John A. Cigliano and **Richard M. Kliman**. Cedar Crest College, Allentown, PA, 18104. *Gene sequencing of conch to test for possible hybridization between Strombus gigas and S. costatus* - The queen conch, *Strombus gigas* is economically important in many Caribbean countries. *S. gigas* is currently in danger of commercial extinction due to over fishing. *S. gigas* shares much of its range with *S. costatus,* which is not experiencing the same stresses as *S. gigas*. *S. gigas* and *S. costatus* are easily distinguished on the basis of size and shell characteristics. However, samples sharing characteristics of both *S. gigas* and *S. costatus* were recently found in Belize. There are three reasonable hypotheses to explain the observations: 1) the unusual conch are members of one of these species, representing an atypical morphology; 2) they are hybrids of the two species; or 3) they are a distinct species. For each of these explanations, different patterns of molecular genetic variation within and among species are predicted. A partial genome sequence has been obtained for *S. gigas*, and genetic analyses are under way to distinguish among these hypotheses. Results to date are reported here. **(93)**

Sewall, Brent J.* and **Gregory G. Turner**. Temple University, Philadelphia, PA 19122; Pennsylvania Game Commission, Harrisburg, PA 17110. *Large-Scale Analysis of Correlates of Bat Susceptibility to White-Nose Syndrome and Consequences for Bat Communities* – White-nose syndrome poses a severe emerging threat to hibernating bats across North America. Researchers and managers have rapidly mobilized to respond to this threat, but our traditional approaches to research and management – in particular, small-scale studies, a single-species focus, and management responsibility divided by political boundaries – are challenged by the rapid geographic spread of the disease and its effects on multiple species. Statistical analyses of data compiled from across species and geographic regions can complement such approaches and facilitate understanding of large-scale spread and impacts from the disease. We compiled published and unpublished data on the impacts of white-nose syndrome on bat colonies, and factors that may correlate with the disease across hibernacula. We then used a multiple regression approach to identify key factors correlated with bat susceptibility to white-nose syndrome and its impacts on bat communities. Our analyses suggest that bat susceptibility to white-nose syndrome varies by bat species and geographic region, and that white-nose syndrome has substantially changed the composition and diversity of hibernating bat communities in affected areas. Further multi-site analyses of bat colony changes and their correlates could enable a more comprehensive understanding of bat susceptibility to white-nose syndrome and its effects on bat communities. **(8)**

Shahalemi, Raushan R.*, and **James C. Hunt**. East Stroudsburg University, East Stroudsburg, PA 18301. *An Analysis of the Effectiveness of a Shark "Blocker" Device to Prevent Gut-Hooking in Recreational Shark Fishing* – Gut-hooking, also known as foul-hooking, is a considerable problem for sport fishermen due to the conservation concerns surrounding pelagic shark populations. Sharks that swallow fishing hooks are at higher risk of injury that can result in death than hooks that remain in the jaw. Data from three seasons (2009 – 2011) of shark fishing by Fish Finder Adventures, Ocean City Maryland, were analyzed to determine the potential effectiveness of a simple prophylactic device designed to reduce gut-hooking. The device, called a shark blocker, was attached above the hook for some shark surveys. Comparisons of catches with and without the blocker were analyzed. The blocker was proven to be very effective in reducing gut-hooking in some species, while it appears to have a limited or no effect in other species. **(141)**

Shaley, Kiel* and **Jana L. Villemain.** Indiana University of Pennsylvania, Indiana, Pa. *Cloning, expression, and purification of two C-terminal fragments of Saccharomyces cerevisiae Srs2 helicase to study structural changes upon binding to Rad 51 protein* - Studies reveal that the Srs2 C-terminal domain (CTD) possesses many features of intrinsically unstructured proteins (IUPs). Homology modeling yields a helicase structure for the Srs2 N-terminus, but lacks a majority of the CTD due to the absence of suitable templates. The Srs2 CTD interacts with the Rad51 recombinase to regulate homologous recombination events and other proteins of the DNA damage response via overlapping binding sites. It is also phosphorylated and sumoylated in response to cellular signals which appears to toggle its activity and function. Since IUPs often adopt specific structures as a result of protein interactions or modifications, we propose that Srs2 CTD activity is altered by structural changes triggered by binding or modification events coupled to cellular conditions. To investigate such structural changes accompanying Rad51 binding using fluorescence spectroscopy, we have designed two Srs2 CTD fragments containing a single trp residue as a fluorescent reporter sensitive to changes in its environment. The fragments also

contain a single cys residue to be modified with coordinating fluorescent dyes for further FRET studies. CTD fragments carrying an N-terminal His tag were produced by amplifying target regions of the Srs2 gene by PCR followed by insertion into a pET28 expression vector. **(28)**

Shaw, Melissa* and **Jane E. Huffman**. East Stroudsburg University, East Stroudsburg, PA 18301. *Molecular characterization of Babesia spp. in Black Bears (Ursus americanus) in New Jersey* - *Babesia* spp. are tick-borne pathogens that infect red blood cells and are the causative agent of babesiosis. Infection with *Babesia* is characterized by intraerythrocytic multiplication and can produce malaria-like symptoms. Over 100 *Babesia* species have been described in a number of vertebrate and mammal hosts; however few of these have been molecularly characterized. One host in which *Babesia* has not yet been characterized is the black bear (*Ursus americanus)*. Blood was collected from 201 black bears (*Ursus americanus*) from five counties in northwestern New Jersey. Sample collection occurred over five research trapping seasons from March 2010 to August 2011. Blood samples were screened for *Babesia* spp. by nested polymerase chain reaction (PCR), amplifying a 560-570bp portion of the 18S rRNA gene. The tick-borne zoonosis, *Babesia*, was detected in 84 of 201 (41.8%) samples. Sequence analysis confirmed the presence of *Babesia* spp. in all of the PCR positive samples. This data represents the first detection of *Babesia* spp. in American black bears (*Ursus americanus*) and indicates that black bears may act as a sentinel species for this pathogen. **(147)**

Sheth, Kesha*[1], Aninash Gabbeta[1], Edward Winter[2], and **Aikaterini Skokotas[1].** [1]Rosemont College, Rosemont, PA 19010, [2]Thomas Jefferson University, Philadelphia, PA 19107. *Assaying spore production in S. cerevisiae by varying optical density* - In *S. cerevisiae,* meiosis is regulated by a tightly controlled induction of early, middle, and late sporulation genes. The induction of middle gene expression is the key step that controls exit from prophase and meiotic commitment. Sum1 is a DNA-binding protein that inhibits middle promoter expression during vegetative growth. Sum1 repression is lifted during prophase. Sum1 is down-regulated during meiosis by cyclin-dependent kinase (Cdk1) and a meiosis-specific CDK-like kinase named Ime2. A Sum1 mutant lacking an Ime2 phosphoacceptor site and 11 candidate Cdk1 sites (Sum1-ci) blocks meiotic development at prophase just prior to the meiotic commitment. In this study, cells were grown mitotically and meiosis was induced by glucose starvation. Both the wild type and Sum1-ci mutant strains were assayed at four different optical densities in order to identify variations in spore production. Our results indicate that the optical density does not affect the degree of sporulation. **(35)**

Shook Jake*, Krisavage Carly, Leedock Eric, and **Fenner Barbara.** King's College, Wilkes-Barre, PA 18711. *Glutamate Induced Oxidative Stress in SH-SY5Y cells: An in vitro model of Post-Traumatic Stress Disorde* - Post-Traumatic Stress Disorder (PTSD) is a debilitating disease that results from over-stimulation of the stress response. During a normal stress response, elevated glucocorticoid concentrations signal, through the hippocampus, to stop the stress response. In chronic stress, glucocorticoid overstimulation of hippocampal neurons leads to excitotoxicity and oxidative stress. Therefore, we developed an *in vitro* model of PTSD using glutamate and 6-OHDA toxicity in SH-SY5Y cells. Neuronal death and oxidative stress were measured using MTT, AlamarBlue, and H_2DCFDA assays. Our data suggest that both glutamate and 6-OHDA can be used to induce cell death, and potentially oxidative stress, but is dependent on the duration of retinoic acid differentiation of the SH-SY5Y cells. We hypothesize that longer retinoic acid treatments induced upregulation of receptors, allowing the cells to be more susceptible to glutamate and 6-OHDA. Current studies are investigating (1) changes in glutamate receptor expression over time, (2) the optimal duration of retinoic acid treatment needed for maximum response to toxins, and (3) the optimal dosage of glutamate needed to induce oxidative stress, without neuronal death. Once this model is optimized, future studies will investigate the effects of cytokines and growth factors on reversing oxidative stress in SH-SY5Y cells. **(50)**

Simons, Pamela D.*, Danielle Hunsinger, Pablo R. Delis, and **Heather F. Sahli.** Shippensburg University, Shippensburg, PA 17257. *Seed dispersal by the Eastern Box Turtle (Terrapene carolina carolina) in South Central Pennsylvania*—The Eastern Box Turtle (*Terrapene carolina carolina*) is the most common terrestrial turtle in the eastern United States, yet little is known about their diet or their role in seed dispersal. We quantified the diet of box turtles in south central Pennsylvania by identifying materials found in the scat of 12 individuals from Letterkenny Army Depot. The samples were sieved to separate seeds and other components of their diet, and seed count and dry mass of each dietary component was obtained. A total of 833 seeds were found in the scat samples and 92% of the samples contained seeds. Other components of the box turtle diets consisted of insects, vegetation, rocks, and molluscs, which were found in 83%, 92% 50%, and 50% of the samples, respectively. Seed mass made up the greatest proportion of biotic matter found in their scat, comprising about half of the total dry weight, followed by molluscs and vegetation. Insect parts made up the smallest percentage of dry weight. Our results suggest fruits make up a substantial portion of box turtle diet in south central Pennsylvania, and indicate that box turtles are potential seed dispersers of a variety of different plant species. **(179)**

Smith, Bruce and **Rob Harvey*.** York College of Pennsylvania, York, PA 17403. *A Study of the Megasporogenesis and Megagametogenesis of Cardamine parviflora L.- C. parviflora* is a member of the *Brassicacea* family and its common name is small-flowered bittercress. It can be found throughout the state and flowers from early spring through the summer months. It displays the common mustard characteristics of 4 separate perianth parts, tetradynamous stamens, and a 2-carpellated silique fruit. Flowers were collected in York, PA, fixed in FPA_{50}, serially dehydrated to 100% ETOH and placed in Herr Fluid. Flowers were dissected on a Raj slide and images were captured using Nikon software at 1,000x via phase contrast microscopy. Images of all stages of megasporogenesis and megagametogenesis were saved and studied. The ovule is of a campylotropous shape with two integuments and the megagametophytic development is of the Polygonum Type. Images and descriptions of developmental stages will be presented. **(106)**

Snyder, Nathan* and **William J. Patrie**. Shippensburg University, Shippensburg, PA 17257. *Characterization of Epidermal Growth Factor Receptor Gene in Glioblastoma Cells* – The epidermal growth factor receptor (EGFR) is frequently oncogenic due to mutation or amplification. In this ongoing study we are attempting to characterize the EGFR gene in glioblastoma cells using complementary techniques: a modified amplified fragment length polymorphisms (AFLP) assay and fluorescence in situ hybridization (FISH). DNA isolated from the glioblastoma cell line SNB19 was digested with MseI restriction enzyme. Ligation of modified MseI adapters to the DNA allows amplification of the 5' and 3' ends of the EGFR gene and the flanking genomic sequences using primers to the ends of the EGFR sequence and to the MseI adapters. Sequencing the products should allow detection of distinct EGFR gene copies. Fluorescent probes to EGFR are being produced to observe the copy number and location of the EGFR gene in the chromosomes of mitotic glioblastoma cells through FISH. The results of these tests will allow us to discern alterations in the glioblastoma cell line that result in a change in the copy number or chromosomal location of the EGFR gene that potentially contribute to malignancy. **(51)**

Spacht, Drew*, Prabhat Kc, Irfan Haider, and **Steven Mauro.** Mercyhurst University, Erie, PA 16546. *The Contribution of Bacterial Pollution by Algal Mats in Recreational Freshwater*- Fecal indicator bacteria (FIB) are commonly used indicators of recreational freshwater quality. There are many potential sources of freshwater contamination by FIB. One such candidate is algal mats, which have the potential to harbor high concentrations of these, and other, microbes. To better understand the extent to which algal mats contribute to bacterial pollution in recreational freshwater, we utilized plating, quantitative PCR, and a metagenomics approach to measure specific and total bacterial populations on algal mats and the recreational freshwater in which it resides. While we found high levels of FIB in algal mats, we found no correlation between the concentration of these microbes in the algae and nearby water. Moreover, population based approaches indicated a different composition of bacteria compared to the water it was obtained from. Taken together, these results indicate that it is unlikely that algal mats are serving as a direct source of bacterial pollution to the recreational water analyzed in this study. **(194)**

Stanley, Jr., Craig E.*, Joseph R. Boland, Matthew E. B. Hansen, and **Rob J. Kulathinal**. Temple University, Philadelphia, PA, 19122. *Identifying genomic signatures of local selection in global populations of Drosophila melanogaster - Drosophila melanogaster* is a remarkably successful species, with a worldwide present day distribution. The species originated in sub-Saharan African several million years ago, as evidenced by the high allelic diversity in the region. *D. melanogaster* is thought to have spread out of sub-Saharan Africa into Europe approximately 10,000 years (~260,000 generations) ago. Approximately 500 years (~13,000 generations) ago, *D. melanogaster* colonized North America, either from African or European populations via colonial shipping routes. It is currently unclear the extent to which genetic differences in North American and European populations relative to African populations play a role fitness. We used a set of ~300 fully sequenced, publicly available, *D. melanogaster* genomes spanning three continents (Africa, North America, Europe) to scan for novel fixations and signatures of selective sweeps in global populations. Approximately 10,000 fixed derived SNPs were discovered in North American *D. melanogaster*. Published annotation data were used to identify genes neighboring discovered fixed SNPs. Comparisons to previous hypotheses concerning the chromosomal distribution of divergence between North America and Africa, as well hypotheses concerning selective pressures in candidate regions, were made. **(95)**

Stanton, Brielle[1*], Kasia Szulborski[2], Lorinette Williams[2] and **Kenneth Pidcock[1].** [1]Wilkes University, Wilkes-Barre, PA 18766 and [2]Dickinson College, Carlisle, PA 17013. *Surveillance of KPC Carbapenemase-Producing Klebsiella pneumoniae, Northeastern Pennsylvania* - Carbapenem-resistant *Klebsiella pneumoniae* isolated in northeastern Pennsylvania were examined for clonality, possession of KPC and other β-lactamase genes, and mobility of β-lactamase genes. Seven carbapenem-resistant *K. pneumoniae* strains, isolated from patients in Scranton hospitals between 2009 and 2011, were screened for KPC using the modified Hodge test and KPC-specific PCR. Isolates were also screened for the presence of SHV and TEM gene sequences. Clonality of the isolates was determined by pulsed-field gel electrophoresis following *Xba*I digestion of genomic DNA. The seven clonally distinct isolates, including one hypermucoviscous isolate, were confirmed to possess KPC-3 lineage genes. All isolates were positive for SHV, TEM, or both. Horizontal transfer of the KPC β-lactamase gene was observed for four of the isolates. Individual transconjugants

that acquired carbapenem resistance also acquired resistance to trimethoprim/sulfamethoxazole and tobramycin. There are multiple clones of KPC carbapenemase-producing *K. pneumoniae* circulating in northeastern Pennsylvania and evidence suggests that the KPC gene may be circulating on readily transmissible genetic elements. **(85)**

Stavish, Gary* and **Garrett Barr.** King's College, Wilkes-Barre, PA 18711. *Effects of Fish on the Feeding Habits of Salamanders in Streams* – Larval stream salamanders feed throughout the day; however, predatory fish cause salamanders to become nocturnal. Laboratory studies show that larval two-lined salamanders (*Eurycea bislineata*) consume fewer prey during the day in the presence of trout, but trout have no impact on salamander feeding at night. Our objectives are to test whether the same patterns in feeding are measureable in the field and to test whether counts of prey show the same patterns as biomass of prey per stomach. We collected larval two- lined salamanders in the early morning and evening from 2 fishless and 1 fish stream. We use the stomach contents of salamanders captured in the morning to estimate nighttime feeding and salamanders captured in the evening to estimate daytime feeding. We identified their stomach contents (Arthropoda), typically to the order or family taxonomic level, measured the body length or head width of each prey item using an ocular micrometer, and calculated the biomass of prey using published length-mass relationships. We will compare patterns in salamander feeding, as measured using prey numbers and prey biomass, between day and nighttime samples and between fish and fishless streams. **(160)**

Stella, Angelina* and **James C. Hunt.** East Stroudsburg University, East Stroudsburg, PA 18301. *Comparison of the Health and Diversity of Coral Reefs in areas of the Caribbean Sea and Indian Ocean* – Coral reefs surrounding the island of Roatán, Honduras in the Caribbean Sea and in Mahé, Seychelles in the Indian Ocean have recently experienced environmental changes that have jeopardized the health of the reef and the diversity of the corals. Sites from marine protected areas were surveyed for coral diversity, and overall reef health was then assessed. Sites selected from the Indian Ocean had a higher health rating than those in the Caribbean Sea. Although the Caribbean sites showed more diversity, they also contained species typically indicative of poor reef health. **(140)**

Stromko, Caitlyn* and **Karl Kleiner.** York College of Pennsylvania, York, PA 17403. *Do Northern Saw-whet Owls (Aegolius acadicus) maintain kin associations during fall migration?* – Migratory birds that maintain post-fledging kin associations often do so 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. Little is known about the kin associations of migratory owls. In this study, we used a genetic analysis to examine forty fall migrating Northern Saw-whet Owls (*Aegolius acadicus*) from Pennsylvania and Montana to answer the question: do Northern Saw-whet Owls maintain kin associations 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 had the same genetic sequence. Only one potential sibling pair based on sharing an identical genetic sequence was revealed, but the two owls were caught in different states during the same migration year. Based on our sampling it does not appear that sibling Northern Saw-whet Owls maintain kinship after fledging, suggesting migratory behavior is instinctual rather than learned. **(172)**

Sullivan, Hillary*, Siobhan Hacker, and **Marlene Cross.** Mercyhurst University, Erie PA 16546. *The Effects of Fertilization Methods on Mycorrhizal Fungi and Rhizobial Bacteria in Soil Previously Used for Conventional Farming* - Treatment of farm soils with chemical fertilizer, compost, or other amendments can profoundly affect the microbial life present in the soil. Mychorrhizal fungi form mutualistic relationships with plants' roots to provide the plants with phosphorous and other nutrients. Rhizobial bacteria provide legumes with nitrogen. Farm crops are likely to be more productive on soils containing these specific fungi and bacteria, which may be depleted in conventionally farmed soils. In this study, we tested the effect of using compost, algae, and biochar during the conversion of conventionally farmed land to organic management. The abundance of mychorrhizal fungi and rhizobial bacteria in the soil was measured after a three-year period. Plots with no amendments and plots with continued chemical fertilization were used as controls. Mychorrhizal fungal abundance, measured using a trap-crop and root staining, was highest in plots where compost was placed on top of the soil as an amendment. The difference was statistically significant when compared to plots treated with algae, biochar, or control plots. Similarly, nitrogen fixing bacteria were significantly higher in the compost-treated plots, as measured by the number of nodules on bean roots. These results suggest that compost application significantly improve the beneficial microbial conditions in the soil. **(92)**

Sulzer, Nicholas*, Lawrence Paddock*, Jonathan Weiss, and **Barbara McCraith.** Misericordia University, Dallas, PA 18612. *Assessing Surface Water Removal Impacts on Bowmans Creek in Wyoming County, Pennsylvania* -The process of hydraulic fracturing has enabled natural gas companies to tap into the vast reserves in the Marcellus Shale region. This technology requires large quantities of water which are acquired from area streams and rivers. We studied the impacts of surface water removal on nutrient dynamics and benthic macroinvertebrates in two different locations, upstream and downstream from surface water pumping sites, of Bowmans Creek. Our preliminary observations indicated that there was

no difference in ammonium, nitrate, and phosphate concentrations between the upstream and downstream sites. However there was a higher diversity of benthic macroinvertebrates upstream from the surface water removal stations compared to downstream. These results suggest the need for further long term research and studies on the effects of surface water removal on higher trophic levels. **(153)**

Tamarkin, Rebecca G.,* and **Eric P. Ingersoll.** Department of Biology, Penn State Abington, Abington, PA 19001. *Transformed Human Breast Epithelial Cells Express Matrix Metalloproteinases*. – Matrix Metalloproteinases (MMPs) are family of extracellular matrix degrading proteases that play key roles in a number of normal and pathological processes. In particular, one pathological process that relies heavily on MMPs is tumor cell metastasis. In this study, we investigate the synthesis of MMPs by three lines of human breast epithelial cells: MCF-10F, E2, and C5. These cells vary in their degree of aggressiveness and invasiveness. We found that all three cell lines produced at least one MMP that was secreted into the medium. Our current focus is to identify which MMPs are produced by these cells using reverse transcription PCR. We will present our current data on the expression and identification of these MMPs by human breast epithelial cells.

Teygart, Ellen L.* and **J. Michael Campbell.** Mercyhurst College, Erie, PA 16546. *Laboratory simulated seasonal changes of lipid and biofilm production in Melosira from Lake Erie.*-The results of this study will indicate whether recreating winter conditions in a laboratory setting can stimulate Melosira species isolated from Lake Erie to produce intracellular lipid deposits, or to promote changes in extracellular biofilms that serve protective functions for algae. The experiment focused on replicating the stressors of winter-to-spring changes that naturally occur in Lake Erie. Collected diatoms were subjected to various conditions of light and turbulence under a constant low temperature, over a period of four weeks. It was hypothesized that changes in lipid and/or biofilm production would occur due to either light or turbulence individually or a combination of both light and turbulence. It is anticipated that the findings of this experiment may be used in the creation of a laboratory system to induce naturally occurring algae to produce lipids for practical uses, such as biofuel production. **(117)**

Thomas, Jennifer * and **Bradley Rehnberg.** York College of Pennsylvania, York, PA 17403. *Behavioral Responses of Mice to Olfactory Cues from Natural Oils* – At present, there are few olfaction-based methods for repelling rodent pests. The goal of this study was to determine whether olfactory cues from natural oils could provide a safer form of rodent control than traditional rodent poisons. We observed the behavioral responses of 15 CD-1 mice to the olfactory cues from citral, peppermint, pine needle, and wintergreen oils. For each trial an individual mouse was placed in a behavioral arena with a sample of the oil being tested. A perforated petri dish was placed in a corner of the arena and the 3 remaining corners contained an empty petri dish. There were 3 different trials conducted for each type of oil: a control trial with no oil, a fresh oil trial, and an evaporated oil trial. During the trials the Opto-varimex 4 software system monitored 6 basic behaviors of the freely-moving mice. Results indicated that the olfactory cues from the oils did not influence those 6 basic behaviors. However, mice avoided dishes containing oil but were willing to approach and touch empty dishes. **(114)**

Thompson, Cassaundra*, Heather Ressler*, Cynthia Surmacz, and **John M. Hranitz.** Bloomsburg University, Bloomsburg, PA 17815**.** *Protease Inhibitors Reduce Degradation of the Cellular Stress Marker HSP70 in Lumbriculus variegatus* - The aquatic worm, *Lumbriculus variegatus* (blackworms), is useful as a bioindicator due to its sensitivity to various environmental toxins and readily observed biological responses such as pulse and tactile responses. Our goal is to correlate these physiological responses with the cellular stress marker, Heat Shock Protein 70 (HSP70). An understanding of this relationship would provide aquatic biologists with a tool to effectively predict sublethal population effects of pollutants in nature and to monitor the health of aquatic ecosystems. To achieve this goal, our work has focused on developing standard conditions for maintaining blackworms and measuring HSP70 levels. Previous work established that acclimation time and aeration do not affect HSP70 levels. In this study, we explore whether HSP70 is degraded during homogenization and investigate the efficacy of protease inhibitors to reduce HSP70 degradation in buffer. The addition of a protease inhibitor cocktail (Roche) containing a broad spectrum of serine and cysteine protease inhibitors increased HSP70 levels 31% ($p=0.005$). Similar results were obtained using a protease inhibitor cocktail from Sigma-Aldrich that also included inhibitors of aspartic proteases and amidopeptidases. These data indicate that HSP70 is degraded during homogenization, and suggest that either protease inhibitor cocktail is acceptable in maximizing HSP70 recovery. **(156)**

Tumminello, Richard* and **Sheryl L. Fuller-Espie.** Cabrini College, Radnor, PA 19087. *Heat-Induced Oxidative Stress in the Earthworm Eisenia hortensis* – Our lab was interested in determining the optimum temperature for culturing earthworm coelomocytes when carrying out in vitro assays. Our study involved culturing coelomocytes at temperatures ranging from 20°C (control) to 40°C for 8 hours and then measuring levels of reactive oxygen species (ROS). A double staining procedure was employed in which coelomocytes were tagged with the fluroescent compounds dihydrorhodamine 123 (DHR 123) for detection of ROS and 7-aminoactinomycin D (7-AAD) as a viability stain to distinguish viable from nonviable cells for analysis. We demonstrate that ROS production increased significantly ($p < 0.05$) and reproducibly at temperatures of 35°C and 40°C, but not at the lower temperatures of 25°C or 30°C. These results illustrate the importance

of minimizing heat-induced oxidative stress in earthworm coelomocytes by conducting in vitro assays at temperatures at or below 30°C. Experiments are currently in progress to investigate whether ROS generated at temperatures greater than 30°C causes oxidation of DNA using antibodies specific for 8-hydroxy-2'-deoxyguanosine (8-OHdG), a marker for base lesions associated with mutagenesis. These results also emphasize that important physiological perturbations could be associated with global warming trends and that the potential for earthworm displacement in certain ecosystems exists. **(42)**

Turner, Alec J.* and **Matthew D. Stone.** Kutztown University, Kutztown, PA 19530. *Ingestion of Sand and its Impact on Dual-Energy X-Ray Absorptiometry Estimates of Body Composition in Turtles* – Dual-energy X-ray Absorptiometry (DXA) provides a means to non-invasively quantify body composition in vertebrates. This study determined the effects of ingested sand on DXA estimates of body composition in box turtles (*Terrapene carolina*). Body composition was estimated for 55 turtles using DXA. Turtles were then classified as having low, moderate, or large quantities of intestinal sand. Bone mineral content, lean tissue, and fat mass estimates were compared among turtles with low, moderate, and large amounts of ingested sand. We found that DXA estimates of bone mineral content were significantly different among turtles with different intestinal artifact scores ($p = 0.05$), but were not significantly different for estimates of lean tissue mass ($p = 0.19$). No significant difference was observed for fat mass among turtles with different intestinal artifact scores ($p = 0.18$). Based on our results, subjects who have a tendency to ingest foreign particles should be fasted prior to DXA scanning to ensure accurate estimates of body composition. **(110)**

Turner, Gregory G.*, and **Brent J. Sewall.** Pennsylvania Game Commission, Harrisburg, PA 17110,Temple University, 1900 North 12th St., Philadelphia, PA 19122. *Bat Mortality and Geographic Spread of White-Nose Syndrome in Pennsylvania* - Six species of northeastern cave bats (*Myotis lucifugus, M. sodalis, M. septentrionalis, M.leibii, Eptesicus fuscus, and Perimyotis subflavus*) are all confirmed to be impacted by white-nose syndrome (WNS) while they hibernate. The disease was first described by state officials at 4 sites in New York during the winter of 2007-2008, and later discovered to have been photographed at the epicenter site of Howes cave in 2006. From this point, WNS has spread to 16 states and 4 Canadian provinces by the end of the 2010-2011 hibernation season. We will describe the spread regionally and within Pennsylvania through the 2011-2012 hibernation season. Typically, mass mortality occurs in the year following or two years following exposure. For this reason, we present overall mortality data of sites that have had WNS for at least 2 full winters, including data collected during the 2011-2012 hibernacula season, and describe the overall decline and differential mortality between species. **(5)**

Turner*, Sara. Mercyhurst University, Erie, PA 16546. *Identification and relatedness of Katmai brown bears* - Non-invasive genetic methods have frequently been used to determine baseline genetic information, relatedness between individuals and address spatial patterns of land use for a variety of species including brown bears. Katmai National Park and Preserve, Alaska is thought to have some of the highest densities of brown bears in North America with large feeding aggregations forming along salmon migrations routes. A brown bear feeding aggregation converges on this highly productive habitat in order to feed on migrating salmon. Genetic samples were collected from bears from 2005-2007 using hair snare traps and a pneumatic rifle. Using 16 microsatellite markers we were able to confirm observational relationships, and assign parentage. We also find that average relatedness values between females, and between females and males is not significantly different that that between males suggesting that the use of the Brooks River salmon as a food source may not be learned through the female parent. **(126)**

Tymochko, Larae*, Jacklyn Papa and **Michael A. Elnitsky.** Mercyhurst University, Erie, PA 16546. *Sublethal injury and 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. **(168)**

Van Sicklin, Lauren* and **Christopher Tipping.** Delaware College, Dolyestown, Pa 18901. *Environmental Factors that Affect Regeneration in Planaria* – This study is being performed to test different environmental conditions that would be present in nature and the affects they have on the speed and efficiently of regeneration on brown planaira (*Dugesia tigrina*). The factors that are being tested are pH, exposure

to light, salinity, extreme temperatures, nitrogen contamination and phosphorus contamination. The planaria are cut once transversely and then exposed to the treatment. Five planaria are used for each treatment and each treatment will have a control group. All other factors besides the one being tested will be kept constant. Each planaria will be measured before cut and measured again regularly throughout the experiment. Each planaria will be compared to the control group of that treatment and any differences will be recorded. **(155)**

Varner, Chelsea[1]*, Brad E. Engle[1], Catherine T. Santai[1], and **Michael J. Doenhoff[2].** [1]Wilson College, Chambersburg, PA 17201. [2] University of Nottingham, United Kingdom. *Analysis of the Relationship Between Fetal Microchimerism Cells in the Spleen and Liver and the Presence and Severity of Idiopathic Thrombocytopenic Purpura* - Cells from the fetus that cross the placenta during pregnancy and remain within the mother's body are known as Fetal Microchimerism cells (FMc). Idiopathic Thrombocytopenic Purpura (ITP), an autoimmune disease which destroys platelets, often occurs in the presence of Hashimoto's Thyroiditis (HT). Since previous research has shown a correlation between FMc and HT, this study investigated a potential link between ITP and FMc in maternal mice. Enhanced Green Fluorescent Protein (EGFP) possessing males were crossed with normal C57BL/6 females, and the females were allowed time for gestation and weaning of their pups. Platelet counts were monitored in maternal mice, and intraperitoneal injections of rabbit anti-mouse platelet antiserum (RAMPS) were used to mimic ITP by inducing thrombocytopenia over 7 day and 14 day periods. Females were sacrificed, and spleens were removed, weighed and digested. Splenocytes and FMc cells were visualized and counted using a fluorescence microscope and hemocytometer. Preliminary results have shown that the ratio of FMc cells to splenocytes is greater in mice induced for thrombocytopenia. These findings indicate a relationship between the degree of platelet destruction and FMc cell concentration in maternal mice; therefore suggesting that FMc cells may play a role in ITP development. **(19)**

Vojtek, Christina M.*and **J. Michael Campbell.** Mercyhurst University, Erie, PA 16546. *Occurrence of lipids and biofilms in nearshore Lake Erie cyanobacteria and diatoms during the fall turnover*-- The purpose of this experiment was to determine whether lipid formation or biofilm development accompanied seasonal shifts in cyanobacteria and diatom populations during fall turnover in nearshore Lake Erie. Algae samples were collected periodically from the photic zone of Lake Erie near Erie, PA using a Wisconsin-style plankton net during the Fall of 2011. Viable algae in the collected samples were identified and counted in the lab. As fall turnover progressed and the water temperature dropped, cyanobacteria and diatoms shifted in abundance. Cyanobacteria were dominant in samples collected during the early part of the fall season, including *Microcystis, Anabaena, Oscillatoria, Aphanizomenon, Ciekisogaerium,* and *Aphanothece*. Diatoms were more abundant later in the fall, including *Melosira, Fragillaria, Navicula,* and *Cyclotella*. Observed variations in intracellular algal lipids and extracellular biofilms over the period of study will be described. **(118)**

Vranicar Kutch, Jennifer* and **Terry Master.** East Stroudsburg University, East Stroudsburg, PA 18301. *Habitat Preference of the Hooded Warbler (Wilsonia citrina) within Delaware Water Gap National Recreation Area* – This ongoing study focuses on Hooded Warbler distribution and abundance within three different habitat types characterized by their understory shrub composition including: (1) native shrubs and trees, (2) non-native Japanese Barberry (*Berberis thunbergii*), and (3) a mixture of native shrubs and Japanese Barberry, both common to the edge of barberry dominated areas. Thirteen 2 square km blocks were chosen in the park within which a subplot dominated by each of the three understory types was established. Ten-minute point counts were conducted three times on the subplots during June in order to determine the number of singing males and their song frequency. In the 2011 field season, there were significantly more males heard within barberry plots than in native understory plots. More males were heard in edge subplots also. The 2012 field season will focus on increasing the sample size, reproductive success within subplot types and surveying the overall avifauna of the three types of understory. **(122)**

Welch, Kara * and **John A. Cigliano.** Cedar Crest College, Allentown, PA 18104. *Using Niche Modeling to Predict Possible Geographic Range Shifts in Strombus gigas (Queen Conch) Under Various Climate Change Scenarios* -- Climate change is a growing concern because it will have unprecedented effects on species, including affecting species distributions. Because climate change affects environmental variables such as seawater density, pH, and surface temperature in marine environments, species must either adapt to the changing conditions or move to remain within their ecological niche. We are using niche modeling, specifically maximum entropy distribution modeling (MaxEnt), to predict the future potential distribution of queen conch under moderate to severe climate -change scenarios. The current range of queen conch is the Caribbean and Atlantic Ocean and preliminary results suggest that under a best-case climate-change scenario, queen conch will shift its range northward with some increase in its current range and southward, and that changes in sea surface temperature and sea salt salinity are the most important variables affecting this shift. We are currently expanding the model to include additional climate-change scenarios. Understanding how climate change might affect queen conch is important because it is a threatened species that is very important to the Caribbean economy. More broadly, this study can be applied to other species to increase our currently limited understanding of how climate change can affect the distribution of marine species. **(139)**

Wetzel, Ashley*, Laura F. Altfeld, Deborah S. Austin, and **Celeste Barthel.** Wilson College, Chambersburg, PA 17201. *Home range size and habitat use of Andean bears (Tremarctos ornatus) in the Intag Region of Northern Ecuador* - The Andean bear (*Tremarctos ornatus*) is one of many large mammals threatened by habitat loss and human conflict. In Northern Ecuador and throughout their geographic range, populations are becoming fragmented due to agricultural growth. Based on habitat loss and bear-human conflict, Andean bear populations are expected to diminish by approximately 30% in the next 30 years. To prevent further population declines, ecological research is necessary. In the Intag Region of Northern Ecuador, six adult Andean bears have been captured and fitted with radio collars. While interning with the Andean Bear Foundation, bear locations were tracked by taking bearings from designated listening stations. Using ArcGIS mapping software, bear locations were determined by triangulation and habitat use was analyzed. Home range sizes were estimated using the Local Convex Hull Method for Utilization Distribution by means of GIS. Starting from the perimeters of each home range, percentages of every type of available habitat were calculated by means of ArcGIS. Using home range maps created using GIS, home range overlap with human developed areas and road ways will be analyzed, in order to better understand bear-human conflict. Based on previous studies and a rise in bear-cattle conflict, an increase in human-bear overlap is expected. **(120)**

Whidden, Howard P.*, Andrew S. Zellner, Michael R. Scafini, and **Shannon M. Williams.** Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA 18301. *Extent and Characteristics of Bat Mortality at Pennsylvania Wind Farms.* – The recent expansion of commercial wind energy facilities in Pennsylvania has raised concerns about the level of bat mortality resulting from collisions with wind turbines. To assess the extent of mortality and possible impacts on the state's bat populations, we conducted full-season daily mortality surveys in 2007 and 2008 at Locust Ridge I Wind Farm, a 13-turbine facility in Schuylkill County, PA. We found 211 bat carcasses in 2007 and 209 bat carcasses in 2008. Mortality characteristics, including species composition, timing of mortality, and age and sex distributions, were similar for the two years. In both years, bat mortality peaked during the late summer and early fall migration period, and more than 70% of fatalities involved the migratory hoary bats, eastern red bats, and silver-haired bats. Mortality was positively correlated with temperature and negatively correlated with wind speed. The extent and characteristics of bat mortality at Locust Ridge I were generally similar to results reported from other wind facilities in the state. Recent experimental studies at wind farms in Pennsylvania and elsewhere have demonstrated that avoidance strategies, including feathering of turbine blades and increased cut-in speeds, can greatly reduce mortality while having little or no impact on power production. **(4)**

Whitford, Tracy*[1] and **Jason D. Williams[2]**. [1]Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA 18301. [2]Department of Biology, Hofstra University, Hempstead, NY 11549. *SEM Analysis of Morphogenesis during Anterior Regeneration in a Spionid Polychaete Marenzelleria viridis* - Scanning electron microscopy (SEM) was used to visualize morphogenesis during anterior regeneration in *Marenzelleria viridis*, a deposit feeding spionid polychaete. Worms were collected from Hempstead Harbor in Sea Cliff, NY (40°50'27.09"N, 73°39'11.46"W) from October through December, 2010. Animals were maintained in ~25 ppt artificial seawater at 15 °C until experiments were initiated. 10 anterior chaetigers were amputated and the remaining posterior portions were allowed to regenerate at room temperature. At 1-15 days post-amputation (dpa), regenerating worms were fixed in 3% glutaraldehyde and processed for scanning electron microscopy. Wound healing occurred by 1-2 dpa, followed by blastema formation. The regenerated tissue began to elongate by 3 dpa, and intersegmental furrows started to form by 4 dpa. Development of segmental features proceeded from posterior to anterior on the regenerate. Chaetae began to form at about 7 dpa, and parapodia rudiments appeared between 8 and 9 dpa. Palp buds formed around 7 dpa, their frontal surfaces exhibited cilia by 9 dpa, and the food groove was present by 13-14 dpa. Nuchal organs formed by 9 dpa. By 14-15 dpa, all major anterior structures had regenerated, though the regenerate was smaller than the original. **(17)**

Williams, Byron*[1], Pooja Jaisinghani[1], Winifred Wolfe[1], Edward Winter[2], and **Aikaterini Skokotas[1].** [1]Rosemont College, Rosemont, PA 19010, [2]Thomas Jefferson University, Philadelphia, PA 19107. *Assessing the role of Sum1 mutants in the meiotic development of S. cerevisiae* - In *Saccharomyces cerevisiae,* meiosis is regulated by a tightly controlled induction of early, middle, and late sporulation genes. The induction of middle gene expression is the key step that controls exit from prophase and meiotic commitment. Sum1 is a DNA-binding protein that inhibits middle promoter expression during vegetative growth. Sum1 repression is lifted during prophase. Sum1 is down-regulated during meiosis by cyclin-dependent kinase (Cdk1) and a meiosis-specific CDK-like kinase named Ime2. A Sum1 mutant lacking an Ime2 phosphoacceptor site and 11 candidate Cdk1 sites (Sum1-ci) blocks meiotic development at prophase just prior to the meiotic commitment (1, 2). In this study, we have obtained Sum1 mutants by site-directed mutagenesis in order to identify the key phosphoacceptor sites. Our results suggest that Cdk1 regulates Sum1 by phosphorylating multiple residues and that these phosphomodifications collaborate to regulate the meiotic commitment switch. **(34)**

Williams, Kirsten M.,* and **Andrew M. Turner**. Clarion University of Pennsylvania, Clarion, PA 16214. *Restoration of Tom's Run from Acid Mine Drainage: A 44-year Study of Perturbation and Recovery* -Few long-term studies have investigated the ability of stream ecosystems to recover from human disturbance. Here we assess the recovery of the Tom's Run watershed in the Clarion River basin of western Pennsylvania. Tom's Run was polluted by acid mine drainage associated with coal mining in the mid-1900s, but mining has ceased and reclamation efforts have been implemented over the last 40 years. A 1967 survey of biological and chemical properties of Tom's Run provides a valuable pre-restoration benchmark with which to assess recovery. We sampled water chemistry, benthic macroinvertebrates, and fish in 2011 to evaluate the recovery of Tom's Run. Watershed-level pH and total alkalinity increased, while free acidity, sulfate, and iron concentrations decreased. Local taxa richness, watershed-level taxa richness, biomass, diversity, and density of macroinvertebrates were all significantly higher in 2011 than in 1967, but %EPT was not significantly different. Local fish species richness, fish density, and Brook Trout density were all significantly higher in 2011 than in 1967, and watershed-level fish richness increased as well. This study represents one of the first to document watershed-level recovery using pre- and post-restoration data collected over a multi-decadal time scale. **(192)**

Wilmont, Ashley*, Travis Marks*, and **Carolyn Mahan**. Penn State Altoona, Altoona, PA 16601. *Baseline water quality data collection of selected streams in the City of Altoona* -The goal of our project was to test and record certain chemical properties and pollutants of streams running through the City of Altoona. Our project was initiated on October 2011. The streams we tested were Mill Run, Spring Run and Brush Run which all run through the City of Altoona, Blair County, Pennsylvania. These streams form the headwaters of the Chesapeake Bay watershed. The reason for this data collection was to monitor the water quality of the streams and also to help the City of Altoona fulfill their Municipal Separate Storm Sewage Systems (MS4) requirements. We have sampled water quality at three different points on each stream (above city limits, within city limits and below city limits). The data we collected were pH, water and air temperature, dissolved oxygen (mg/l), specific conductance, nitrates (mg/l), sulfates (mg/l) and alkalinity (mg/l). Along with the data, we record precipitation, water appearance and stream type. Data for this project was collected and reported on a monthly basis. To date, we have found no signs of water quality impairments. **(152)**

Wolfe, Winifred*[1], Edward Winter[2] and **Aikaterini Skokotas[1].** [1]Rosemont College, Rosemont, PA 19010, [2]Thomas Jefferson University, Philadelphia, PA 19107. *Analysis of meiotic commitment using a GFP-tagged protein in S. cerevisiae* - In *S. cerevisiae*, the induction of middle genes is the key step that controls exit from prophase and meiotic commitment. In prophase I, chromosomes join with their homologue and are held together via a structure called the synaptonemal complex. This complex forms in pachytene and it is held in place via the Zip 1 protein. At pachytene, the cell can continue the meiotic program, or reverse the process and grow mitotically. In our study, we determined that cells that return to vegetative growth form aggregates of Zip1 that has been fused to green-fluorescent protein. These aggregates may be related to structures termed polycomplexes, which are found in meiotic cells of evolutionarily diverse organisms. The Zip1-GFP aggregates persist even after the SCs disintegrate. The ability to clear protein aggregates has been correlated with cellular aging in a variety of disease states. Experiments with calcofluor, a dye that can be used to score replicative aging, suggest that the cells' ability to retain Zip1-GFP aggregates did not correlate with replicative aging. **(36)**

Zhang, Shuhan*, Shixiong Hu, and **Scott Collenburg.** East Stroudsburg University, East Stroudsburg, PA 18301. *GIS-Based Study on the Distribution of Water Temperature in Local Stream*-The Paradise Creek Watershed is a sub-watershed in the Delaware River Basin. Historically, the high quality water, mountainous forests and low temperatures in the tributaries have provided ideal habitats for cold-water fish. However, recent and projected future urbanization, population growth and economic development represent a potential for degradation of the high quality habitats for wild trout. This study aims to research on the spatial pattern of water temperature and its controlling factors. Stream temperature loggers have been used to measure stream temperature since November of 2008 in 34 points in the watershed. From this data, historical trends are created through comparison of air and stream temperature. Combing the data collected by local stream watcher group, the violation frequencies of the cold water fishery (CWF) standard are explored. Using GIS, the spatial pattern of water temperature distribution indicates that the dams, ponds, lakes and waste water discharge sites are major factors to influence the violation of CWF standard. The suggestions for improving future management are also given based on the results of data analysis. **(137)**

Zhong, Yuan*, Jonny Kettering*, Michael Parker, and **Shiliang Wang**. Millersville University, Millersville, PA 17551. *Comparative Genomic and Phylogenetic Analysis of Short-chain Prenyltransferases, Triterpene synthases and Terpene Synthases in Arabidopsis: Do They Share A Common Origin with Cyanobacteria Homologues?* Prenyltransferases (PTS) synthesize key intermediates for the biosynthesis of diverse terpenes. Short-chain prenyltransferases (SC-PTS) direct flux into different branches of terpene biosynthesis and so control product distribution. A genome-wide analysis of SC-PTS gene family in *Arabidopsis thaliana* identified 27 full length PTS genes, among which 10 are new candidate PTS. The gene structural analysis and genome location cluster features of *Arabidopsis* SC-PTS, TPS and TTPS, which all belong to the Terpenoid cyclases/Protein prenyltransferas-

es superfamily, reveals their relatedness within and between the families as well as with cyanobacteria homologues. The phylogenetic and conserved domain analysis of these three families in relation to cyanobacteria homologues suggests that these mechanistically related families might have a common evolutionary origin with the cyanobacteria homologues, and SC-PTS appears to be more closely related to TTPS than to TPS. Some SC-PTS members appear to be more closely related to TTPS or TPS or cyanobacteria homologues than to the other members of SC-PTS, and appear to have common proximate ancestor with cyanobacteria homologues. SC-PTS appear to have more diverse structure and function than TPS and TTPS. These results provide novel insights into the function, evolution and relatedness of PTS, TPS and TTPS. **(97)**