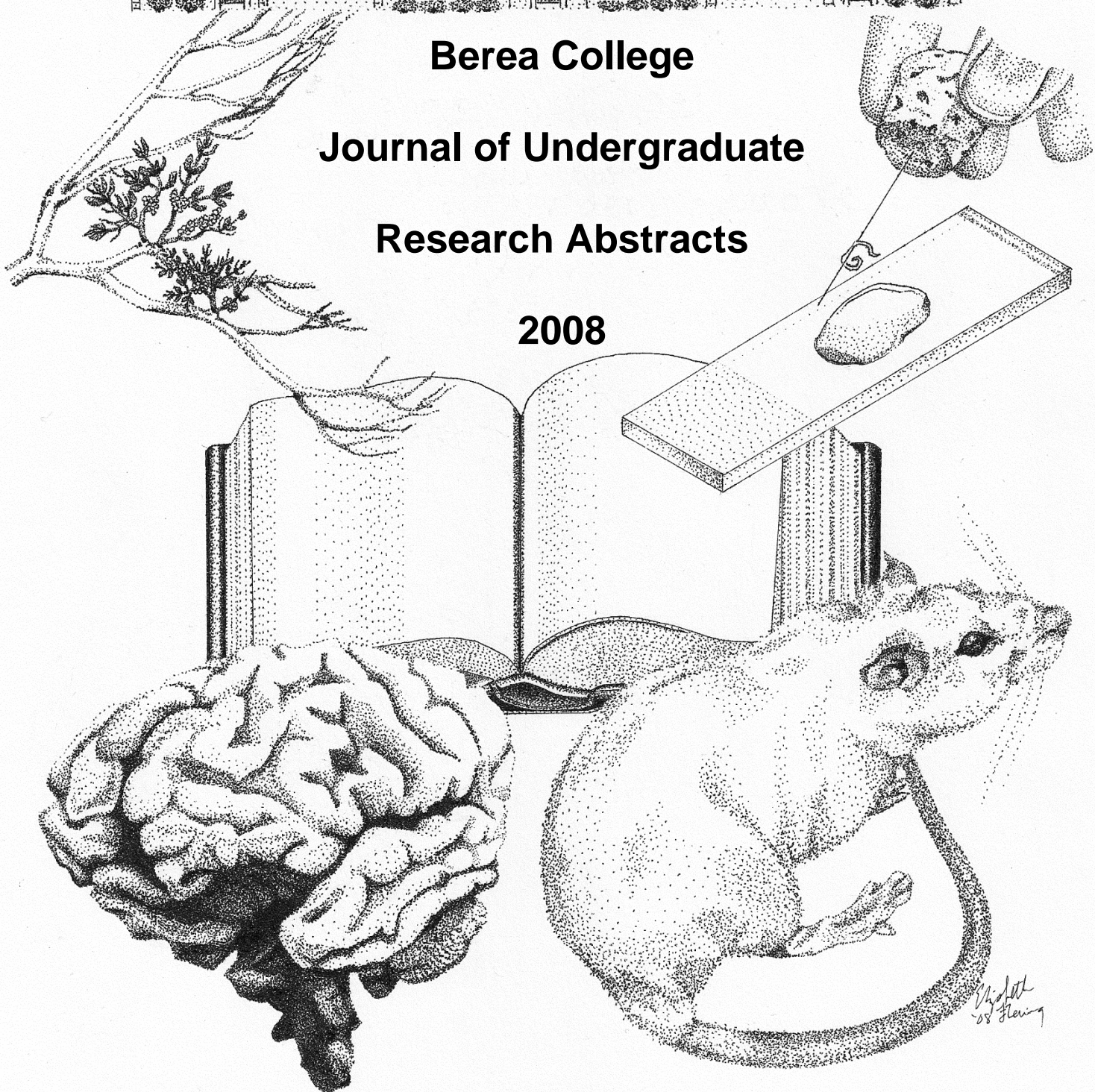


Berea College

Journal of Undergraduate

Research Abstracts

2008



INTRODUCTION

(Ronald B. Rosen, Professor of Biology, Editor)

During the Fall 2006 Science Retreat, the science faculty at Berea College approved a student initiative proposed by Emilie Throop (Biology - Class of 2007; presently a graduate student at Kansas State University) to publish abstracts of undergraduate research on an annual basis. The inaugural edition of the, "Berea College Journal of Undergraduate Research Abstracts Science Division 2006", was published with Emilie's assistance. In this third issue an effort has been made once again to include undergraduate research completed by students in disciplines outside the sciences. The common theme to the research represented by these abstracts is that the: (1) original proposal was peer-reviewed and/or (2) work was subsequently presented by undergraduates at an off-campus meeting. Though certainly not inclusive of all the undergraduate research conducted last year by Berea College students, this year's journal contains 45 abstracts representing majors from eleven different academic departments. These abstracts represent research completed on-campus with funds provided by Berea College's Undergraduate Research and Creative Projects Program (URCPP – 14/19 projects reporting), a few "special" campus/department designated projects, senior research projects, and Berea College's Term Abroad. Off-campus projects were funded by the Kentucky Biomedical Research Infrastructure Network (KBRIN) at the Universities of Kentucky and Louisville, and by various universities and research organizations around the country. The abstracts are published as submitted; editorial changes have only been made: (1) to the titles of each abstract by the editor to ensure consistency of style and (2) by department chairs. Much of this collaborative work was presented at off-campus meetings including the Annual Meeting of the Kentucky Academy of Science (35 presentations and 13 awards received). Off-campus presentations and awards are listed below each abstract where appropriate. It should be noted that a number of these projects were also presented on campus at the 9th Annual Undergraduate Research & Internship Symposium, October 17, 2008. Hopefully this publication will continue in the future and serve as a resource for: (1) Berea College's efforts in admissions, development, and departmental self-studies and (2) students to locate interesting programs for future research and acknowledge their accomplishments.

ACKNOWLEDGEMENTS

This third edition of the, "Berea College Journal of Undergraduate Research Abstracts", would not have been possible without the support of many people. I acknowledge Carolyn Newton, Academic Vice-President/Provost, for providing funds to print hard copies of these abstracts. Also, many thanks to Berea College faculty for their contributions, and of course to their students for whose hard work this journal is a reflection. Once again, we wish to acknowledge Elizabeth Fleming (senior Biology/French double major) for providing the beautiful cover art. Finally, we would like to thank all the off-campus mentors at the following research centers and universities for supporting Berea students during the summer of 2008 (number of Berea students in brackets): Georgia State University (1), Mayo Clinic (2), University of Utah (1), University of Wisconsin (1), Vanderbilt University (4) and the Zoological Society of San Diego (1). A special acknowledgement is once again extended to

former Berea College students and current trustees, Dr. Harold Moses (Vanderbilt University) and Dr. Chella David (Mayo Clinic), for continuing to coordinate and support research experiences at their respective institutions for Berea College undergraduates.

TABLE OF CONTENTS

DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES

Sausage as a value-added local pork product. **STEVEN HAMMOND, JONATHAN SANDS** and **MICHAEL PANCIERA**, Department of Agriculture and Natural Resources, Berea College, Berea, KY 40404. 1^c

Effects of human disturbance on ground beetle diversity. **OLIVER POGUE, SEAN CLARK** and **SARAH PAULSON**, Department of Agriculture and Natural Resources, Berea, KY 40404. 2^c

Home-based processing to add value to horticultural products. **JONATHAN SANDS STEVEN HAMMOND, SEAN CLARK** and **SARAH PAULSON**, Department of Agriculture and Natural Resources, Berea College, Berea, KY, 40404. 3^c

DEPARTMENT OF BIOLOGY

p63 defines an epithelial phenotype and represses the mesenchymal-specific gene COL5A1. **DIKSHYA BASTOKOTY**¹, **CHRISTOPHER BARTON**² and **JENNIFER A. PIETENPOLI**²; ¹Department of Biology, Berea College, Berea, KY 40404; ²Department of Biochemistry, Vanderbilt-Ingram Cancer Center, Vanderbilt University, Nashville, TN 37212. 4

Kinetic imaging of single molecule interaction (KISMI): SNARE proteins and UNC-18 interactions. **TSERING DOLMA**¹, **CHRIS HOPKINS**², **WAYNE DAVIS**² and **ERIK JORGENSEN**², ¹Department of Biology, Berea College, Berea, KY 40404; ²Department of Biology, University of Utah, Salt Lake City, UT 84112. 5

Development of a recombinant expression system for preparation of Goodpasture Disease autoantigens. **AARON FIDLER**¹, **C. CUMMINGS**², **V. PEDCHNK**² and **BILLY G. HUDSON**². ¹Department of Biology, Berea College, Berea, KY, 40404; ²Departments of Medicine & Biochemistry, Vanderbilt University Medical Center, Nashville, TN 37232. 6

Proterometra macrostoma (Digenea: Azygiidae): The effect of osmolality on the retraction of the distome body into its cercarial tail. **ELIZABETH FLEMING, ALAINA FAUST, ALISHA HOLMBERG** and **RONALD ROSEN**, Department of Biology, Berea College, Berea, KY 40404. 7^c

The perception of phagostimulants is context dependent in larval *Manduca sexta*. **YILI GAN, JORDAN HARRISON, TRICIA STEPHENS** and **MARC ROWLEY**, Department of Biology, Berea College, Berea, KY 40404. 8^c

- The loss of stromal TGF- β leads to increased expression of STAT1P1. **MILUKA GUNARATNA**¹, VERONICA R. PLACENCIO², XIAOHONG LI², ALI-REZA SHARIF-AFSHAR², MAGALY MARTINEZ-FERRER² and NEIL A. BHOWMICK². ¹Department of Biology, Berea College, Berea, KY 40404; ²Departments of Cancer Biology and Urologic Vanderbilt-Ingram Cancer Center, Vanderbilt University, Nashville, TN 37212. **9**
- The role of post-translational modifications in the pathogenesis of arthritis. **JACOB GUNNELL**¹ VEENA TANEJA² and CHELLA DAVID², ¹Department of Biology, Berea College, Berea, KY, 40404; ²Department of Immunology, Mayo Graduate School, Rochester, MN, 55905. **10**
- The effect of the commensal bacterium, *Prevotella nanceiensis*, on experimental autoimmune encephalomyelitis, an animal model for multiple sclerosis. **MEGAN JACKSON**¹, ASHUTOSH MANGALAM² and CHELLA DAVID². ¹Department of Biology, Berea College, Berea, KY, 40404; ²Department of Immunology, Mayo Graduate School, Rochester, MN 55905. **11**
- Genetic analysis of RecQ DNA helicase function in *Aspergillus nidulans*. CHRISTOPHER ALLEN¹, **KAYLA KINKER**², JORDAN ROBINSON³, SANDEEP MALLAREDDY⁴ and PETER MIRABITO⁴. ¹Centre College, Danville, KY 40422; ²Department of Biology, Berea College, Berea, KY 40404; ³Department of Biology, Georgetown College, Georgetown, KY, 40324; ⁴Department of Biology, University of Kentucky, Lexington, KY 40506. **12**
- Emotion induced by music: subjective and physiological measures. **LUKE MILLER**^{1,2}, TATO SKHADZE³ and BARBARA WHEELER.⁴ ¹Department of Biology, Berea College, Berea, KY 40404; ²KBRIN Summer Undergraduate Research Program, University of Louisville, Louisville, KY 40292; ³Department of Psychiatry & Behavioral Sciences, University of Louisville, Louisville, KY 404292; ⁴School of Music, University of Louisville, Louisville, KY 40292. **13**
- Influence of elevation, host species, and host size on the density of mistletoe, *Phoradendron robustissimum* (Viscaceae) in Costa Rica. **JESSICA R. PRICE**. Department of Biology, Berea College, Berea, KY 40404. **14**
- Behavioral ecology and translocation of the endangered Stephens' Kangaroo Rat (*Dipodomys stephensi*). **JESSICA R. PRICE**, Biology Department, Berea College, Berea, KY, 40404. **15**
- Genetic analysis of caloric restriction in *Caenorhabditis elegans*. **APRIL TAYLOR**¹, NICK THOMPSON² and JIM LUND³. ¹Department of Biology, Berea College, Berea, KY, 40404; ²Centre College, Department of Chemistry, Danville, KY 40422; ³Department of Biology, University of Kentucky, Lexington, KY 40506. **16**

Troubleshooting NK-1 receptor immunohistochemistry to permit a taxonomy of respiratory networks in the ventrolateral medulla of the neonate rat. **ALEXIS THOMAS**, Berea College, Berea, KY 40404, **DEEPAK MISHRA** and **NICHOLAS M. MELLEN PH.D**, Kosair Children's Hospital Research Institute Department of Pediatrics, University of Louisville, Louisville, KY 40202. **17**

Regulation of Notch4 activity in kidney tubule cells. **CRYSTAL THOMAS**^{1,2}, **TIMOTHY D. CUMMINS**,³ **MICHELLE T. BARATI**³, **MICHAEL D. MENDENHALL**³ and **DAVID W. POWELL**³; ¹Department of Biology, Berea College, Berea, KY 40404; ²KBRIN Summer Undergraduate Research Program, University of Louisville, Louisville, KY 40292; ³Departments of Medicine and Nephrology, School of Medicine, University of Louisville, Louisville, KY 40292. **18**

DEPARTMENT OF CHEMISTRY

Chelation and N-heterocyclic carbene complexes. **DONIA J. ARTHUR** and **ANES KOVACEVIC**, Department of Chemistry, Berea College, Berea, KY 40404. **19^c**

The synthesis of boc-(4-fmoc)aminoproline. **KABINDRA KAFLE**, **EFUA WILMOT** and **MATTHEW J. SADERHOLM**, Department of Chemistry, Berea College, Berea, KY 40404. **20^c**

Roles of p38 MAPK signaling in *Drosophila*. **KYLE BLACKBURN**¹, **MORGAN KELLY**², **MARA LAYNE**³, **QUIAN CHEN**⁴, **SUSAN HARRISON**⁴, and **DOUGLAS HARRISON**⁴, ¹Kentucky Wesleyan College, Owensboro, KY 42301, ²Transylvania University, Lexington, KY 40508, ³Berea College, Berea, KY 40404, and ⁴University of Kentucky, Lexington, KY 40506. **21**

HER2-overexpressing *PIK3CA* mutated breast cancer cells rely on HER3 for their survival. **OLIVER MUNYARADZI**¹, **ANINDITA CHAKRABARTY**² and **CARLOS L. ARTEGAG**^{2,3}. ¹Department of Chemistry, Berea College, Berea, KY, 40404; Departments of ²Medicine and ³Cancer Biology, Vanderbilt-Ingram Comprehensive Cancer Center, Nashville, TN 37232. **22**

Pyridylidene N-heterocyclic carbene complexes. **JOSHUA A. SCHMELING**, **THEINT THEINT** and **ANES KOVACEVIC**, Department of Chemistry, Berea College, Berea, KY 40404. **23^c**

DEPARTMENT OF EDUCATION STUDIES

Scientific inquiry: Factors that influence evolution of scientific skills and dispositions. **JESSICA CARNES**, **AMY JONES** and **JON SADERHOLM**, Department of Education Studies, Berea College, Berea KY 40404. **24^c**

DEPARTMENTS OF GENERAL STUDIES AND SOCIOLOGY

Digging into the past: Discovering the social history of Kentucky's African Americans. **DEBRA BULLUCK, KIM NGUYEN, ANDREW BASKIN¹ and JACKIE BURNSIDE²,** **25^c**
¹Department of General Studies, ²Department of Sociology, Berea College, Berea, KY 40404.

DEPARTMENT OF PHILOSOPHY AND RELIGION

Living in hope: An assessment of the Hope VI Redevelopment Project in Louisville, Kentucky. **EHIDIAMHEN AKHETUAMHEN¹, ARLETT FRANCO¹, MICHELLE TOOLEY¹,** **26^c**
JEFF GLIDDEN², JEFF HORTILLOSA², and RICK AXTELL², ¹Department of Philosophy and Religion, Berea College, Berea, KY 40404 and ²Department of Religion, Centre College, Danville, KY 40422.

DEPARTMENT OF PHYSICAL EDUCATION, HEALTH AND ATHLETICS

Self-selected walking pace as a predictor of maximal oxygen consumption. **ASHLEY CROCKETT¹ and JEFF MCCLUNG².** **27^c**
¹Department of Biology and ²Department of Physical Education, Health and Athletics, Berea College, Berea, KY 40404.

Financial success for the new private practice chiropractor. **DAVID HERMAN and MARTHA BEAGLE,** **28^c**
Department of Physical Education, Health and Athletics, Berea College, Berea, KY 40404.

DEPARTMENT OF PHYSICS

Investigating the plausibility of blue straggler production without cluster dynamics. **MATTHEW BAILEY¹, ROBERT D. MATHIEU², and AARON M. GELLER²,** **29**
¹Department of Physics, Berea College, Berea, KY 40404 and ²Department of Astrophysics, University of Wisconsin, Madison, WI.

Numerical simulations on disordered classical spin systems. **BRANDON BROWN, BRAD STEELE and MARTIN VEILLETTE,** **30^c**
Department of Physics, Berea College, Berea, KY 40404.

Investigation of AGN variability in the optical regime. **DIANA GUDKOVA**^{1,3}, H. RICHARD MILLER², WESLEY THOMAS RYLE, and **AMER LAHAMER**,
^{1,2}Department of Physics and Astronomy, Georgia State University, Atlanta, GA 30302,
³Department of Physics, Berea College, Berea, KY 40404. **31**

Laser ablation of diamond. **W. D. NORRIS**¹, **D. M. GILMOUR**¹, R. E. HAUFLER² and **A. S. LAHAMER**¹,¹Physics Department, Berea College, Berea, KY 40404 and ²MDS Analytical Technologies, 71 Four Valley Drive, Concord ON Canada L4K 4V8. **32^c**

Study of the period of variable star at Berea College Observatory. **JIMMY ROP**, **RAMESH ADHIKARI**, **WILLIAM COLE** and **TRACY HODGE**, Department of Physics, Berea College, Berea, KY 40404. **33^c**

DEPARTMENT OF PSYCHOLOGY

Tell me a story: The effects of multiple stimuli on preschooler's memory and story preference. **ERRINN A. BIXBY**, Department of Psychology, Berea College, Berea, KY 40404. **34^c**

The effects of physical appearance and subjective description on rated likability. **SAMANTHA BUCHANAN**, Department of Psychology, Berea College, Berea, KY 40404. **35^c**

To tell the truth: The effects of viewer and presenter personal political preferences on perceptions of sincerity. **JOHN DAMRON**, Department of Psychology, Berea College, Berea, KY 40404. **36^c**

Above Average Effect (AAE): The link between knowledge, focalism, and comparative judgments. **ANTHONY HOLMES** Berea College, Berea, KY 40404. **37^c**

Robbers Cave revisited: The effects of race and instructions on implicit and explicit measures of racial prejudice. **BRIAN OWENS**, Department of Psychology, Berea College, Berea, KY 40404. **38^c**

The effects of gender and condition on fifth graders' block stacking performance. **LACEY OWENS**, Department of Psychology, Berea College, Berea, KY 40404. **39^c**

Sometimes you can't win for losing; The effect of stereotype threat on Sudoku performance. **DANIELLE PELENKAHU**, Department of Psychology, Berea College, Berea, KY 40404. **40^c**

The effect of object familiarity and time on incidental recall. **JULIA UL PRICE**, Department of Psychology, Berea College, Berea, KY 40404. **41^c**

Read'n, rite'n and residue; Using the Cloze Procedure to explore the persistence of memory. **42^c**
MEGAN RODGERS, Department of Psychology, Berea College, Berea, KY 40404.

Predicting academic success in the third semester. **MEGAN RODGERS, KALEIGH MCCOY, BOZHIDAR BASHKOV** and **ANGELA SUTTON**, Department of Psychology, Berea College, Berea, KY 40404. **43^c**

DEPARTMENT OF TECHNOLOGY AND INDUSTRIAL ARTS

Engineering a human power/electric hybrid commuter vehicle. **GEORGE SHEA, NOAH MCGRAW, CHRISTOPHER DUEKER** and **BRAD CHRISTENSEN**, Department of Technology and Industrial Arts, Berea College, Berea, KY 40404. **44^c**

DEPARTMENTS OF WOMEN'S STUDIES AND HISTORY

Restoring the Oliver Street Community School: History and Preservation. **ENCHANTA JACKSON, JUSTIN CORNELISON, LINDA STRONG-LEEK¹** and **DWAYNE MACK²**, ¹Department of Women's Studies, ²Department of History, Berea College, Berea, KY 40404. **45^c**

(Page Number)^c = Research Conducted On Berea College Campus With Berea Faculty

Names Of Berea College Students & Faculty In Bold

DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES

Sausage as a value-added local pork product. STEVEN HAMMOND, JONATHAN SANDS and MICHAEL PANCIERA, Department of Agriculture and Natural Resources, Berea College, Berea, KY 40404.

The Berea College Farm, the teaching laboratory for the Department of Agriculture and Natural Resources, sells frozen pork to the public at the Berea Farmers Market. Consumers tend to prefer particular cuts, leaving less popular cuts to accumulate in inventory. Sausage production and sale was evaluated as a means to increase net income and improve inventory turnover. The objectives of this research were to: 1) evaluate different sausage recipes with consumer taste tests; 2) develop enterprise budgets for small-scale sausage production and compare the net returns to those derived from selling the less popular cuts directly to consumers; and: 3) examine sausage manufacturing options and relevant state and federal regulations. Taste tests provided some insights into the general preferences of this population and suggest which of the recipes will likely generate the greatest sales. The enterprise budgets indicate that a small increase in net profits is generated by processing less desired cuts into sausage by a commercial custom processor. If adequate facilities exist, sausage processing can be done in a local inspected kitchen, providing for a greater range of possible recipes options while maintaining a relatively similar profit margin when compared to using the custom processor. Federal regulations do not require sausage sold directly to the end-user to have USDA inspection, however, local health departments may have jurisdiction over this process, resulting in statewide regulations that are not uniform.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Agricultural Sciences Section: 1st place in undergraduate research competition)

URCPP Funded Research

DEPARTMENT OF AGRICULTURE AND NATUAL RESOURCES

Effects of human disturbance on ground beetle diversity. OLIVER POGUE, SEAN CLARK and SARAH PAULSON, Department of Agriculture and Natural Resources, Berea, KY 40404.

Understanding the influence of human disturbance on biological diversity is critically important in guiding resource use and ecosystem management in a world with an increasing human population, diminishing natural resources, and impaired ecosystem functioning. Insects are useful biological indicators for monitoring the ecological effects of human activities because of their ubiquity and ground beetles (Coleoptera: Carabidae) in particular may be good candidates as indicators as they are among the most common soil-dwelling insects found living in temperate ecosystems and relatively easy to sample. We evaluated the effects of land use on the diversity of ground beetles in central Kentucky by using pitfall trap data collected between 2005 and 2008 in forest, clear-cut, and agricultural sites in and around Berea, Kentucky. These treatments represented a range of human disturbance frequencies and intensities with the agricultural sites representing high and frequent land disturbance and the forest sites, minimum disturbance. Although species composition was influenced by land use, species diversity was not significantly reduced with increasing disturbance.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Ecology and Environmental Science Section)

URCPP Funded Research

DEPARTMENT OF AGRICULTURE AND NATUAL RESOURCES

Home-based processing to add value to horticultural products. JONATHAN SANDS, STEVEN HAMMOND, SEAN CLARK and SARAH PAULSON, Department of Agriculture and Natural Resources, Berea College, Berea, KY 40404.

Passage of Kentucky House Bill 391 in 2003 allows for the production and sale of value-added food products generated from raw, farm-grown, horticultural ingredients to be sold at farmers markets. This legislation presents farmers with options and opportunities to add value to most fruits and a limited selection of vegetable crops to potentially increase profits. During the summer of 2008 we evaluated the potential to increase the profitability of fresh fruits by processing them into preserves and selling them at the Berea Farmers Market. Our research indicates that producing preserves from fruit that is somewhat blemished or damaged (such as ripe strawberries after a heavy rain) can turn an otherwise unsellable product into one with greater market value than the fresh, unblemished berries. However, if the fruit is blemish-free and in high demand, processing into preserves will likely not add enough value to justify the time and expense of processing. Therefore, processing strawberries that are somewhat dirty due to rain or blackberries with insect damage as preserves appears to be profitable. But processing other fruits that are typically blemish-free, such as blueberries, will provide only a marginal increase in profit over the fresh fruit under current local market conditions.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Agricultural Sciences Section; 3rd place in undergraduate research competition)

URCPP Funded Research

DEPARTMENT OF BIOLOGY

p63 defines an epithelial phenotype and represses the mesenchymal-specific gene COL5A1. DIKSHYA BASTOKOTY¹, CHRISTOPHER BARTON² and JENNIFER A. PIETENPOLI²; ¹Department of Biology, Berea College, Berea, KY 40404; ²Department of Biochemistry, Vanderbilt-Ingram Cancer Center, Vanderbilt University, Nashville, TN 37212.

p63, a homolog of the p53 tumor suppressor, is essential for proper development of stratified epithelia. Unlike p53^{-/-} mice, which are developmentally normal but succumb to spontaneous tumorigenesis, p63^{-/-} mice die within minutes of birth due to a complete lack of stratified epithelia and all its derivatives. Recently, the Pietnpol lab discovered that p63 is able to promote an epithelial cell phenotype and that siRNA-mediated depletion of p63 in primary human keratinocytes resulted in an increased ability of these cells to migrate. In this study, we used high-throughput analyses of genomic p63 binding sites to identify direct target gene(s) that may contribute to the role of p63 in repressing mesenchymal cell phenotypes. Collagen-5A1 (COL5A1) was identified as a direct transcriptional target of repression by Δ Np63 α , the predominantly expressed p63 isoform. In human epithelial cells, Δ Np63 α directly binds a genomic sequence located near the COL5A1 gene. siRNA-mediated depletion of p63 was found to result in an increase in COL5A1 mRNA levels, suggesting that Δ Np63 α directly represses the transcriptional state of COL5A1. Finally, we found that by depleting COL5A1 expression in squamous cell carcinoma cells (which normally express high levels of COL5A1), we were able to abrogate the ability of these cells to migrate in culture. Collectively, these data suggest that Δ Np63 α can act as a transcriptional repressor of the COL5A1 gene. Additionally, we propose that the increased migration index observed in epithelial cells following p63 depletion may be, at least in part, due to the subsequent increase in COL5A1 expression.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Cellular and Molecular Biology Section; 3rd place in undergraduate research competition)

Vanderbilt University Internship

DEPARTMENT OF BIOLOGY

Kinetic imaging of single molecule interaction (KISMI): SNARE proteins and UNC-18 interactions. TSERING DOLMA¹, CHRIS HOPKINS², WAYNE DAVIS² and ERIK JORGENSEN², ¹Department of Biology, Berea College, Berea, KY 40404; ²Department of Biology, University of Utah, Salt Lake City, UT 84112.

SNARE proteins play significant role in neurotransmission. The SNARE proteins of syntaxin, SNAP25, and snaptobrevin bind and create the SNARE complex that drives neurotransmitter vesicle fusion. Accessory proteins of the Sec1p/Munc18 (SM) family are required for any SNARE-mediated vesicle fusion. UNC-18 is an SM protein with a well-established role in binding to syntaxin at the synapse. However, it has controversial role in binding to the core complex. Genetics experiments demonstrate UNC-18 is required for vesicle fusion. However, biochemistry experiments reveal UNC-18 binds an inactive form of syntaxin and thus may acts as an inhibitor. Affinity measurements for UNC-18s interaction to syntaxin monomer and the SNAREs complex should reveal which interaction predominates in the neuron. A novel method for affinity measurements involves Kinetic Imaging of Single Molecule Interaction (KISMI), which allows observation of single protein molecule affinities free of molecular crowding artifacts. Using the new in-fusion cloning technique, SNARE proteins have been precisely constructed in configurations ready for KISMI analysis. Affinity measurements of UNC-18 and its mutants are expected to uncover the molecular contacts involved in SNARE protein binding.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Cellular and Molecular Biology Section)

University of Utah Internship

DEPARTMENT OF BIOLOGY

Development of a recombinant expression system for preparation of Goodpasture Disease autoantigens. AARON FIDLER¹, C. CUMMINGS², V. PEDCHNK² and BILLY G. HUDSON².

¹Department of Biology, Berea College, Berea, KY, 40404; ²Departments of Medicine & Biochemistry, Vanderbilt University Medical Center, Nashville, TN 37232.

Goodpasture Disease is a rare autoimmune condition that presents with symptoms of glomerulonephritis, pulmonary hemorrhaging, hematuria and dysuria. At the molecular level, the disease is characterized by autoantibodies against a self-antigen in the glomerular basement membrane of kidney and alveolar basement membrane of lung, specifically, the non-collagenous (NC) domain of the $\alpha3$ -chain of Type IV collagen. How the autoantibodies bind the autoantigen remains obscure. The present study was designed to develop a recombinant expression system for preparing isotopically-labeled autoantigen for structure analysis by nuclear magnetic resonance spectroscopy. To this end, a strain of the *P. pastoris* yeast (strain GS115) was selected to express the recombinant protein. This system was selected based on its ability to perform post-translational modifications, its ease of use, and its capability of generating isotopically labeled proteins for NMR studies. We have cloned the autoantigen into the PICZ α B vector using *Pst* I and *Not* I restriction enzymes. The plasmid has been verified by sequencing and transfected into yeast. Steps are now underway to determine whether the autoantigen is expressed. After successful expression, the recombinant protein will be assayed for proper folding, the presence of disulfide bonds, expression yield and recognition by Goodpasture autoantibodies.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Cellular and Molecular Biology Section; 3rd place in undergraduate research competition)

Vanderbilt University Internship

DEPARTMENT OF BIOLOGY

Proterometra macrostoma (Digenea: Azygiidae): The effect of osmolality on the retraction of the distome body into its cercarial tail. ELIZABETH FLEMING, ALAINA FAUST, ALISHA HOLMBERG and RONALD ROSEN, Department of Biology, Berea College, Berea, KY 40404.

The life cycle of the digenetic trematode, *Proterometra macrostoma*, incorporates a snail intermediate host and a centrarchid fish definitive host. Just prior to *P. macrostoma*'s emergence from its snail intermediate host into a freshwater environment, the distome body of the largest cercaria in the redia exits the redia and completely withdraws into its cercarial tail within the snail's mantle cavity. The conditions which promote this retraction and the associated time frame are unknown. The purpose of the present study was to: (1) describe the process of retraction and its approximate time frame and (2) assess the effect of osmolality on the process of cercarial retraction. At the initiation of retraction, the entire cercaria became relatively stationary, and the distome body began a series of contractions and expansions which culminated in its complete withdrawal into its tail in less than two minutes. Significantly more cercariae withdrew into their tails in Artificial Snail Water (ASW; 59/124; 47.6%) than in Artificial Pond Water (APW; 21/124; 16.9%). Significantly fewer distome bodies separated from their tails in ASW (3/124; 2.4%) compared to APW (24/124; 19.4%). The majority of distome bodies retracting into tails in APW occurred in the initial five minutes (16/21; 76.2%). By contrast, considerable retraction was observed throughout the initial 25 minutes of the experiment in ASW.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Zoology Section; 1st place in undergraduate research competition)

Berea College Special Projects

DEPARTMENT OF BIOLOGY

The perception of phagostimulants is context dependent in larval *Manduca sexta*. YILI GAN, JORDAN HARRISON, TRICIA STEPHENS and MARC ROWLEY, Department of Biology, Berea College, Berea, KY 40404.

Manduca sexta larvae are good model organisms for studying caterpillar feeding behavior. Previous research has determined specific reference compounds that act as either feeding stimulants or feeding deterrents. The simplest model of a feeding decision system would suggest that these gustatory inputs would be considered in an additive manner. Thus we hypothesized that increasing the concentration of stimulants in a mixture would result in increased feeding on that mixture. Conversely increasing the concentration of deterrents would result in decreased feeding on that mixture. We tested this hypothesis by assaying feeding behavior on mixtures of the feeding stimulants glucose and inositol and the feeding deterrents caffeine and KCl. Our results indicate that rather than this simple additive model, the feeding decision system of larval *M. sexta* is influenced by the overall pattern of inputs such that addition of stimulants to a mixture does not necessarily result in an increase in consumption.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation –Zoology Section)

URCPP Funded Research

DEPARTMENT OF BIOLOGY

The loss of stromal TGF- β leads to increased expression of STAT1P1. MILUKA GUNARATNA¹, VERONICA R. PLACENCIO², XIAOHONG LI², ALI-REZA SHARIF-AFSHAR², MAGALY MARTINEZ-FERRER² and NEIL A. BHOWMICK². ¹Department of Biology, Berea College, Berea, KY 40404; ²Departments of Cancer Biology and Urologic Vanderbilt-Ingram Cancer Center, Vanderbilt University, Nashville, TN 37212.

The prostate is an androgen dependent organ. It is critical to understand the role of androgens when treating prostate cancer as androgen deprivation is the last line of reliable therapy for men that fail radiation or surgery. Levels of transforming growth factor- β (TGF- β) in the prostate increase immediately following androgen ablation. It has been observed that the TGF- β type II receptor is lost in the stroma of prostate cancer patient biopsied tissues. A conditional TGF- β type II receptor knockout mouse model of stromal fibroblasts (Tgfbr2^{fspKO}) was used to determine the role of stromal TGF- β in the context of androgen ablation. The Tgfbr2^{fspKO} mice were found to have prostates that develop into adenocarcinoma and were refractile to androgen ablation. Laser capture microdissected stromal tissues of Tgfbr2^{floxE2/floxE2} and Tgfbr2^{fspKO} prostates were used to study the gene expression through microarray analysis. Results obtained by the microarray showed differentially expressed transcription factors within the stroma including YAP1, RelA, STAT1P1 and NCor1. Cultured Tgfbr2^{floxE2/floxE2} and Tgfbr2^{fspKO} stromal cells treated with bicalutamide, an androgen receptor antagonist, was used to study the effect of androgen ablation in the context of stromal TGF- β signaling. Real-time PCR confirmed the increased expression of YAP1, STAT1P1 and RelA, whereas NCor1 was down regulated in the stroma of Tgfbr2^{fspKO} compared to control Tgfbr2^{floxE2/floxE2} cells. The further treatment with bicalutamide on Tgfbr2^{floxE2/floxE2} and Tgfbr2^{fspKO} resulted in transient increases of gene expression. Further studies will be focused on TGF- β regulation of STAT1P1, a STAT3 antagonist positively-regulated by Wnt3a (negatively regulated by Tgfbr2).

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Physiology and Biochemistry Section)

Vanderbilt University Internship

DEPARTMENT OF BIOLOGY

The role of post-translational modifications in the pathogenesis of arthritis. JACOB GUNNELL¹ VEENA TANEJA² and CHELLA DAVID², ¹Department of Biology, Berea College, Berea, KY, 40404; ²Department of Immunology, Mayo Graduate School, Rochester, MN, 55905.

The Human Leukocyte Antigen (HLA) region contains multiple genes that are related to immune system function. Previous research has shown that there is a linkage between a HLA allele, DRB1*0401, and a predisposition to rheumatoid arthritis. Rheumatoid arthritis is an autoimmune disease in which the proteins in the synovial membrane are targeted by the immune system, leading to inflammation and joint tissue damage. In order to develop a model to study the development of rheumatoid arthritis, transgenic mice that can express human HLA alleles were developed. Studies conducted with transgenic mice expressing HLA-DRB1*040 alleles have shown that these mice develop collagen-induced arthritis, a mouse analog of rheumatoid arthritis. The goal of this study was to determine the immune system response to synovial proteins that were modified through the process of citrullination. Citrullination replaces arginine with citrulline in the peptide. While arginine is positively charged, citrulline is a polar molecule, allowing binding of the synovial proteins to the MHC Class II protein. In humans, this process can be caused by an excess of Ca²⁺ ions due to inflammation. This may help explain why smoking and viral infections are linked with higher incidence of the disease. Transgenic mice were primed with different citrullinated synovial peptides. Seven days later the mice were sacrificed, and the lymph nodes were extracted. Lymphatic cells were harvested, plated, and challenged with immunizing peptides to examine T-cell response. Tritium was used to measure cell proliferation. The T-cell response was significantly higher in mice primed with citrullinated peptides than the mice primed with the control peptides. Additionally, the response was higher in females, corresponding to the gender bias found with rheumatoid arthritis in humans. It appears, that in the DRB1*0401 mice, the replacement of arginine with citrulline in the expressed human transgenic protein allows this modified MHC Class II protein to bind to the synovial proteins, triggering the immune response.

DEPARTMENT OF BIOLOGY

The effect of the commensal bacterium, *Prevotella nanceiensis*, on experimental autoimmune encephalomyelitis, an animal model for multiple sclerosis. MEGAN JACKSON¹, ASHUTOSH MANGALAM² and CHELLA DAVID². ¹Department of Biology, Berea College, Berea, KY, 40404; ²Department of Immunology, Mayo Graduate School, Rochester, MN 55905.

The gastrointestinal tract is densely populated with commensal bacteria that are in contact with mucosal-associated lymphoid tissues. In order to prevent chronic inflammation, some commensal bacteria induce an anti-inflammatory immune response. An ongoing inflammatory condition such as multiple sclerosis, a demyelinating autoimmune disease of the central nervous system, may be controlled by a systemic anti-inflammatory response induced by commensal bacteria. The DR3 and DQ8 alleles of HLA class II genes are associated with multiple sclerosis. HLA class II genes encode the MHC complex which directs the negative selection of auto-reactive T lymphocytes in the thymus. DR3.DQ8.AE^o double transgenic mice immunized with proteolipid protein, the major myelin protein in the central nervous system, develop experimental autoimmune encephalomyelitis (EAE) and serve as an animal model. Feeding *Prevotella nanceiensis* to DR3.DQ8.AE^o mice after the induction of EAE reduced disease severity. However, the bacteria did not induce an anti-inflammatory response in the small intestine or in the periphery. The beneficial effects of *P. nanceiensis* may be due to the decrease in the production of chemokines MIP-1 α , MIP-1 β , and MCP-1 by splenocytes in response to proteolipid protein. Decreased production of MIP-1 α , MIP-1 β , and MCP-1 may prevent macrophages and other immune cells from crossing the blood-brain barrier to damage the myelin sheaths of neurons.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Health Sciences Section; 2nd place in undergraduate research competition)

Mayo Clinic Internship

DEPARTMENT OF BIOLOGY

Genetic analysis of RecQ DNA helicase function in *Aspergillus nidulans*. CHRISTOPHER ALLEN¹, KAYLA KINKER², JORDAN ROBINSON³, SANDEEP MALLAREDDY⁴ and PETER MIRABITO⁴. ¹Centre College, Danville, KY 40422; ²Department of Biology, Berea College, Berea, KY 40404; ³Department of Biology, Georgetown College, Georgetown, KY, 40324; ⁴Department of Biology, University of Kentucky, Lexington, KY 40506.

recQ helicases are a conserved sub-family of DNA helicases that are critical for genome maintenance in all cells. *recQ* helicases have been implicated in all aspects of DNA metabolism, including DNA replication, DNA repair, gene transcription, and telomere maintenance. For example, defects in the WRN *recQ* helicase in humans cause Werner Syndrome, a premature ageing disease. This project is part of a new research program aimed at developing the fungus, *Aspergillus nidulans*, as a model system to study *recQ* helicase function. Like mammals, *A. nidulans* has multiple *recQ* helicase genes, which are called *musN*, *orqA*, and *tlhA*. The goals of this project were to create strains of *A. nidulans* that are deficient in *recQ* helicase genes alone and in combination with other genes involved in DNA repair or telomere maintenance. These strains would then be evaluated for defects in DNA repair or telomere maintenance. Our results indicate that *recQ* helicase function is essential for viability in *A. nidulans*. They also identify genetic interactions between DNA damage response genes, telomere related genes, and *recQ* helicases. These interactions begin to define roles for *A. nidulans recQ* helicases in genomic stability and provide a focus for future study of these important enzymes in *A. nidulans*.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Cellular and Molecular Biology Section)

KBRIN Funded Research

DEPARTMENT OF BIOLOGY

Emotion induced by music: subjective and physiological measures. LUKE MILLER^{1,2}, TATO SKHADZE³ and BARBARA WHEELER.⁴ ¹Department of Biology, Berea College, Berea, KY 40404; ²KBRIN Summer Undergraduate Research Program, University of Louisville, Louisville, KY 40292; ³Department of Psychiatry & Behavioral Sciences, University of Louisville, Louisville, KY 404292; ⁴School of Music, University of Louisville, Louisville, KY 40292.

The focus of this research project was to examine the relationship that visual stimuli and music have on evoking emotions. The goal was to determine which sensory input, pictures or music, has the strongest effect on the emotional state. The experiment was broken into three distinct parts. The first part was to rate the emotion elicited by different classical music excerpts on an arousal and Valence scale. The second part of the experiment involved a similar rating of emotion of arousal and valence with only emotion-eliciting pictures. The final part of the experiment was to rate the arousal and valence of a combination of pictures and music. Based on our observations, we were able to determine that the musical stimulus holds the strongest effect on the emotion induction.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Psychology Section)

KBRIN Funded Research

DEPARTMENT OF BIOLOGY

Influence of elevation, host species, and host size on the density of mistletoe, *Phoradendron robustissimum* (Viscaceae) in Costa Rica. JESSICA R. PRICE, Department of Biology, Berea College, Berea, KY 40404.

Phoradendron robustissimum (Viscaceae) is a dioecious, evergreen, epiphytic hemiparasitic plant dispersed by birds of certain host trees in Mexico, Costa Rica, and other Central American countries. Its haustorial roots tap into the xylem tissue for water and minerals, while the plant produces its own photosynthate. This study was conducted during the spring of 2008 in the Monteverde Region, Puntarenas Province, of Costa Rica, to examine whether the density of mistletoe, *Phoradendron robustissimum*, is a function of the host species, host size (diameter at breast height [DBH]), and/or elevation of the host species. *Phoradendron robustissimum*-infested trees were identified, and field station botanists verified identifications. Data were then collected on the density of mistletoe by visually counting mistletoe clumps of the infested tree species. The DBH was obtained for each host species, and the elevation was recorded for each location of *Phoradendron robustissimum*. Within the study site, *P. robustissimum* was found on *Sapium glandulosum*, *S. laurifolium*, and *S. macrocarpum* (Euphorbiaceae). ANCOVA was significant relating clump density to host size, but not to host species or elevation. ANOVA revealed that host trees differed significantly in size with *Sapium glandulosum* being larger than *S. macrocarpum*. The small data sample of *Sapium laurifolium* was not included in either of these statistical analyses.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation –Botany Section; 3rd place in undergraduate research competition)

Berea Term Abroad Funding

DEPARTMENT OF BIOLOGY

Behavioral ecology and translocation of the endangered Stephens' Kangaroo Rat (*Dipodomys stephensi*). JESSICA R. PRICE, Biology Department, Berea College, Berea, KY 40404.

Stephens' Kangaroo Rat (*Dipodomys stephensi*), a Federally endangered rodent species in the Heteromyidae, is an endemic, nocturnal granivore known from western Riverside County, California. This rodent is endangered because of accelerated habitat degradation and destruction from urbanization and farming. In the summer of 2008, a research study was conducted on a population of the endangered Stephens' Kangaroo Rat at the Metropolitan Water District of Riverside County. Individual rats were translocated from the area under risk for urban development to the protected Lake Skinner Reserve in Riverside County. Data was collected and observations were made for 48 individuals to better understand the social interactions between and among these individuals toward a goal of more successful translocation. Individuals were caught in Sherman live traps using a millet and oat bait. Data was collected on each individual trapped including weight and reproductive level. Fecal samples also were taken. After each kangaroo rat was ear-tagged, observations were made to identify different interactions between individuals and to better understand home ranges. Each individual was fitted with a radio transmitter and held in captivity in cages to monitor their physical condition. Following the described observations, each individual was moved into an acclimation cage at the release site on the Lake Skinner Reserve. After acclimation, individuals were released, and, the release site was monitored, protected, and managed for the Stephens' Kangaroo Rats. Radio telemetry data was recorded to determine the success of the translocations. These data results will be presented.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Zoology Section; 1st place in undergraduate research competition)

Zoological Society Of San Diego Internship

DEPARTMENT OF BIOLOGY

Genetic analysis of caloric restriction in *Caenorhabditis elegans*. APRIL TAYLOR¹, NICK THOMPSON² and JIM LUND³. ¹Department of Biology, Berea College, Berea, KY, 40404; ²Centre College, Department of Chemistry, Danville, KY 40422; ³Department of Biology, University of Kentucky, Lexington, KY 40506.

Several cellular pathways are known to regulate the aging process. One of these aging pathways is under the control of Clk genes and caloric restriction in the small nematode worm *Caenorhabditis elegans*. Caloric restriction is feeding an animal less food than an ad libitum diet while still providing adequate nutrition. It is known to extend lifespan in many animals including mammals and *C. elegans*. The Clk gene class phenotypes include development, slower ultradian processes, and a longer lifespan. We wanted to test if short term starvation in developing worms could extend worm lifespan similar to the effect of caloric restriction. Worms were caloric restricted for either ten or eighteen hours during larval development and then assayed for lifespan. The ten-hour starvation lengthened lifespan moderately and was most effective at the L3 developmental stage. In previous microarray experiments, six genes with lower expression levels in caloric restricted and Clk worms were identified and found to extend worm lifespan when individually knocked out using RNA interference. To characterize which aging pathway these novel aging genes act through, double knockouts were made by combining a new aging gene with a mutation in a known aging pathway, either an insulin-like signaling pathway gene or a Clk gene and then lifespan was assayed. We found that two of the genes, *abu-8* and *gst-20*, showed additive lifespan increases when combined with an insulin-like signaling pathway gene or a Clk gene while additional genes had pathway-specific effects.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Cellular and Molecular Biology Section)

KBRIN Funded Research

DEPARTMENT OF BIOLOGY

Troubleshooting NK-1 receptor immunohistochemistry to permit a taxonomy of respiratory networks in the ventrolateral medulla of the neonate rat. ALEXIS THOMAS, Berea College, Berea, KY 40404, DEEPAK MISHRA and NICHOLAS M. MELLEN PH.D, Kosair Children's Hospital Research Institute Department of Pediatrics, University of Louisville, Louisville, KY 40202.

The issue being studied in this research is the ways in which mammals' breath. The purpose of this study was to identify the specific neurons responsible for breathing in the Ventrolateral Medulla. Immunohistochemistry was used in order to identify these neurons, which is a technique used to label neurons based on the proteins which they express. The results obtained using confocal microscopy, which allows us to only focus on the fluorescent signal from the section being illuminated, showed us that it is possible to label neurons with immunohistochemistry. This research gives us a tool in order to visualize the networks of the Ventrolateral Medulla and the neurons responsible for this action of breathing. With further research one could identify the specific neurons involved and look to see how these neurons are being interacted upon.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Cellular and Molecular Biology Section)

KBRIN Funded Research

DEPARTMENT OF BIOLOGY

Regulation of Notch4 activity in kidney tubule cells. CRYSTAL THOMAS^{1,2}, TIMOTHY D. CUMMINS,³ MICHELLE T. BARATI³, MICHAEL D. MENDENHALL³ and DAVID W. POWELL³; ¹Department of Biology, Berea College, Berea, KY 40404; ²KBRIN Summer Undergraduate Research Program, University of Louisville, Louisville, KY 40292; ³Departments of Medicine and Nephrology, School of Medicine, University of Louisville, Louisville, KY 40292.

Diabetic nephropathy (DN) is a serious illness that progresses towards end stage kidney disease in many diabetics. A prominent component of DN is tubulointerstitial fibrosis (TIF). Prior studies have shown that transforming growth factor- β (TGF- β), a prominent profibrotic factor, plays a vital role in the TIF related to DN. Preliminary findings from our suggests that Notch4 participates in TGF- β signaling in human cultured kidney tubule cells (HK11 cells), implying that Notch4 has an important role in TGF- β -mediated tubule effects in DN. The active intracellular regions of Notch4 (N4ICD) consist of several distinctive domains an previous studies have found that the removal of various intracellular region domains resulted in changes in protein localization and in distinct Notch4-mediated cellular functions (e.g. endothelial cell sprouting, apoptosis). We hypothesized that deletion of the C-terminal (CT) region would alter the localization and activity of the N4ICD in cultured HK11 cells. To test this hypothesis the mutant and the wild type were transfected into the HK11 cells, and analyzed by confocal microscope. Then we further examined Notch-mediated transcriptional activity using a Notch-specific reporter assay. Our findings showed that the wild type N4ICD localized to specific sub-nuclear compartments. However, the CT deletion (N4ICD- Δ CT) disrupted this localization. The transcriptional reporter assay showed that activity was higher with expression of the N4ICD- Δ CT than with the full length N4ICD. These findings suggest that the C-terminal actively plays a role in the localization and transcriptional activity of N4ICD within HK11 cells.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Cellular and Molecular Biology Section)

KBRIN Funded Research

DEPARTMENT OF CHEMISTRY

Chelation and N-heterocyclic carbene complexes. DONIA J. ARTHUR and ANES KOVACEVIC, Department of Chemistry, Berea College, Berea, KY 40404.

N-heterocyclic carbenes have become increasingly popular ligands in recent years. They are found to be a good alternative for more traditional phosphine based ligands. They are fully tunable sterically and to some extent electronically. This research examines the role of chelation in reactions of N-heterocyclic carbene ligands with $\text{Ir}(\text{H})_5(\text{PPh}_3)_2$ and $[\text{Ir}(\text{H})_2(\text{PPh}_3)_2(\text{Acetone})_2]\text{X}$. While chelation is not essential in the reactions of N-heterocyclic carbene ligands with $\text{Ir}(\text{H})_5(\text{PPh}_3)_2$, it is crucial in reactions with $[\text{Ir}(\text{H})_2(\text{PPh}_3)_2(\text{Acetone})_2]\text{X}$.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Chemistry Section)

Short Term Research Project

DEPARTMENT OF CHEMISTRY

The synthesis of boc-(4-fmoc)aminoproline. KABINDRA KAFLE, EFUA WILMOT and MATTHEW J. SADERHOLM, Department of Chemistry, Berea College, Berea, KY 40404.

Cationic antimicrobial peptides (CAMPs) are a class of natural antibiotic compounds utilized as a first line of defense by many organisms. It has been proposed that the proline-rich class of cationic antimicrobial peptides (PCAMPs) act by interfering with the function of chaperonins (chaperone proteins) during protein folding within a cell. Assuming that high proline content is important for the function of these peptides, we are designing proline analogs that will be functionalizable through the sidechain. To that end, the proline analog analog boc-(4-fmoc)aminoproline was synthesized and characterized. In future studies it will be used to generate a range of nongenetic proline analogs that will be incorporated into potential antimicrobial peptides.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Chemistry Section)

URCPP Funded Research

DEPARTMENT OF CHEMISTRY

Roles of p38 MAPK signaling in *Drosophila*. KYLE BLACKBURN¹, MORGAN KELLY², MARA LAYNE³, QUIAN CHEN⁴, SUSAN HARRISON⁴ and DOUGLAS HARRISON⁴,
¹Kentucky Wesleyan College, Owensboro, KY 42301, ²Transylvania University, Lexington, KY 40508, ³Berea College, Berea, KY 40404, and ⁴University of Kentucky, Lexington, KY 40506.

p38 proteins are a family of Mitogen Activated Protein Kinases (MAPKs), components of a conserved signaling pathway found from yeast to flies. The p38 MAPK pathway is essential for efficient stress response and proper development in vertebrates. MAPK signaling is vital to humans because aberrant p38 signaling can result in various disorders such as heart disease, cancer, arthritis, and neurodegenerative diseases. The goal of this project is to determine how mutations in p38 proteins effect stress response, as well as their role in development in *Drosophila*. Flies have two types of p38 proteins, p38a and p38b. Previous reports showed that p38a mutants have reduced capability to handle certain stressors such as dry starvation, osmotic stress, and heat shock. Here we find that p38b mutations also caused a reduced resistance to most stressors, with the exception of heat shock. We also find that animals lacking both p38a and p38b die during development, with about half dying during embryogenesis and most of the remainder dying as larvae. Most double mutants have no visible defects.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Cellular and Molecular Biology Section)

KBRIN Funded Research

DEPARTMENT OF CHEMISTRY

HER2-overexpressing *PIK3CA* mutated breast cancer cells rely on HER3 for their survival. OLIVER MUNYARADZI¹, ANINDITA CHAKRABARTY² and CARLOS L. ARTEGAG^{2,3}.

¹Department of Chemistry, Berea College, Berea, KY, 40404; Departments of ²Medicine and ³Cancer Biology, Vanderbilt-Ingram Comprehensive Cancer Center, Nashville, TN 37232.

The phosphatidylinositol 3-kinase (PI3K) pathway regulates many cellular processes including proliferation, growth, survival and migration. In many breast tumors, hyperactivation of the pathway occurs via two major mutations in E545K (exon 9) and H1047R (exon 20) of the p110 α gene (*PIK3CA*), the catalytic subunit of PI3K. Binding of growth factors to their receptor tyrosine kinase (RTK) serves as a major stimulus for activation of the PI3K pathway. *HER2* (*Human Epidermal Growth Factor Receptor/EGFR-2*), an RTK oncogene amplified in 25% of breast cancers, is a potent inducer of the PI3K pathway. Much of the signaling activity through HER2 occurs via heterodimerization with HER3. Very little is known about the mechanisms underlying the activation of the PI3K pathway by RTKs like HER2 and HER3. The objective of our study was to determine whether breast cancer-associated *PIK3CA* mutants rely on HER3 for their activation and tumorigenic potential in the same way as wild-type *PIK3CA*. We performed siRNA-mediated knock-down of HER3 in MCF10A human mammary epithelial cells engineered to over-express HER2 and H1047R *PIK3CA* mutation and in UACC893 breast cancer cells with endogenous *HER2* amplification and H1047R *PIK3CA* mutation. We compared the survival of the control versus HER3 siRNA-transfected cells by proliferation assay and crystal violet staining. HER3 knock-down had a dramatic effect on survival of breast epithelial or tumor cells co-expressing HER2 and H1047R *PIK3CA* mutation. These observations suggest that similar to the WT PI3K, the H1047R oncogenic mutant relies on the HER2-associated HER3 signaling in HER2 positive breast cancer cells.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Cellular and Molecular Biology Section; 1st place in undergraduate research competition)

Vanderbilt University Internship

DEPARTMENT OF CHEMISTRY

Pyridylidene N-heterocyclic carbene complexes. JOSHUA A. SCHMELING, THEINT THEINT and ANES KOVACEVIC, Department of Chemistry, Berea College, Berea, KY 40404.

N-heterocyclic carbenes have become increasingly popular ligands in recent years. They are found to be a good alternative for more traditional phosphine based ligands. They are fully tunable sterically and to some extent electronically. This research examines pyridylidene N-Heterocyclic carbene ligands in reactions with $\text{Ir(H)}_5(\text{PPh}_3)_2$ and $[\text{Ir(H)}_2(\text{PPh}_3)_2(\text{Acetone})_2]$ X to give iridium pyridylidene complexes.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Chemistry Section)

URCPP Funded Research

DEPARTMENT OF EDUCATION STUDIES

Scientific inquiry: Factors that influence evolution of scientific skills and dispositions.
JESSICA CARNES, AMY JONES and JON SADERHOLM, Department of Education Studies,
Berea College, Berea KY 40404.

This research project was conducted in hopes of better understanding the development of the skills and understandings that support scientific inquiry and the factors that may influence it. The findings from this study will be important for the development of a summer research institute for high school science teachers. Participants for this study were selected to represent the spectrum of stages in the evolution of a science researcher. A convenience sampling methodology was chosen due to the short period over which this research project was completed. Participants took part in several semi-structured interviews. Interview questions were based on the definition of science inquiry in the National Science Education Standards (NSES, NRC, 1996). Questions were designed to expose experiences that impacted participants' inquiry-related understandings, dispositions, and skills. Transcripts of interviews and follow-up questions were coded separately by each student researcher and then compared to look for emergent themes. Results suggest that the understanding of scientific inquiry is affected by mentor guidance, knowledge of skills and content, and past educational environments. Novices depend on mentorship whereas experts prefer working independently. Novices are apt to see only one way of doing an experiment, while experts can construct multiple ways of doing the same experiment. Novices tend to understand experiments as only having a right or wrong answer, whereas experts find importance in any solution they reach. The design and content of a curriculum for a summer research experience for high school science teachers will be designed incorporating the results from this research project.

*94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008,
University of Kentucky, Lexington, Kentucky (Poster Presentation – Science Education Section;
1st place in undergraduate research competition)*

URCPP Funded Research

DEPARTMENTS OF GENERAL STUDIES AND SOCIOLOGY

Digging into the past: Discovering the social history of Kentucky's African Americans. DEBRA BULLUCK, KIM NGUYEN, ANDREW BASKIN¹ and JACKIE BURNSIDE², ¹Department of General Studies, ²Department of Sociology, Berea College, Berea, KY 40404.

Researching, collecting historical data, and writing entries about people, places and events of significance to Kentucky African American life and culture comprised the major tasks accomplished for the Kentucky African American Encyclopedia (KAAE) this summer. When the KAAE is published by the University Press of Kentucky (forthcoming in 2011), it will mark the first publication of all fifty states dedicated to documenting and preserving African American history. While focusing on, though not restricted to, encyclopedia sections "S to Z", the Berea College team gathered archival information, photographed historic sites during field explorations, conducted oral history interviews and wrote 43 entries for editors' review. Besides entries about shotgun houses, poet Effie Waller Smith, schools and civil rights lawsuits, history was recovered about three black Civil War soldiers buried in the Walker Newcomb Cemetery at Mount Vernon, Rockcastle County.

Kentucky African American Encyclopedia Project: Black Life and Culture in Kentucky, July 23, 2008, Berea Public Library, Berea, Kentucky, co-presenters with KAAE General Co-Editor, Dr. Gerald Smith, Department of History, University of Kentucky

The 2008 Annual Conference of Anthropologists and Sociologists of Kentucky (A.S.K.), Oct 18th, Western Kentucky University's Glasgow Regional Center (Presentation – Undergraduate Research)

URCPP Funded Research

DEPARTMENT OF PHILOSOPHY AND RELIGION

Living in hope: An assessment of the Hope VI Redevelopment Project in Louisville, Kentucky. EHIDIAMHEN AKHETUAMHEN¹, ARLETT FRANCO¹, MICHELLE TOOLEY¹, JEFF GLIDDEN², JEFF HORTILLOSA², and RICK AXTELL², ¹Department of Philosophy and Religion, Berea College, Berea, KY 40404 and ²Department of Religion, Centre College, Danville, KY 40422.

Promising a full transformation of the nation's most distressed public housing projects, HOPE VI legislation speaks convincingly of goals that most people would affirm: deconcentration of poverty, crime reduction, and the creation of mixed income neighborhoods. Using qualitative research and ethnographic methodology, our community-based research project examined the state of affordable housing for the poor in the United States through the lens of Louisville, Kentucky's second HOPE VI project. The purpose of the present study was: (1) to understand the Louisville HOPE VI projects within the context of United States poverty and the history of affordable housing legislation; and most important, (2) to assess the effect of the HOPE VI process and outcomes on the former residents of Clarksdale Housing Project. Louisville's HOPE VI plan for Clarksdale committed to no loss of affordable housing for the poor. While this goal was commendable, HOPE VI programs do not work toward long-term change by adding the goal of the reduction of poverty to housing legislation and practice. Interviews with former residents affirmed the systemic barriers of race, class, and poverty and that public housing reform cannot be enacted adequately without sustained attention to almost 70 years of public housing experience. For politicians and housing officials, HOPE VI sparked imagination of a better way for cities to redevelop their public housing projects. For a small percentage of old residents, the dream of HOPE VI has indeed become a reality. Through research and connections with HOPE VI advocacy groups in other states, some stakeholders envisioned what true reform of public housing might look like. But for the overwhelming majority, HOPE VI represents yet another federal program that shuttled them to another public housing project with a different street address but the same concentration of poverty, crime, and hopelessness.

*Paper Presentation at the Annual meeting of the Society of Christian Ethics, January 8, 2009
Hyatt Regency Hotel, Chicago IL*

URCPP Funded Research

DEPARTMENT OF PHYSICAL EDUCATION, HEALTH AND ATHLETICS

Self-selected walking pace as a predictor of maximal oxygen consumption. ASHLEY CROCKETT¹ and JEFF MCCLUNG². ¹Department of Biology and ²Department of Physical Education, Health and Athletics, Berea College, Berea, KY 40404.

In a nation where obesity is running rampant, it is unclear what factors determine fitness level. The purpose of this study was to determine factors that might be used as indicators of fitness level as measured by oxygen consumption and blood lactate level. Volunteer subjects were assessed for height and weight, body composition, leg length, blood pressure, current medications, and familial/personal medical ailments. Volunteers exhibiting extremely high blood pressure, a BMI of 30+, age of 39+ (with the exception of those who were determined to have a healthy lifestyle), high blood glucose levels or chronic illness were excluded from the study. Normal walking pace was determined for each research subject. Each subject's maximal oxygen consumption was determined. The walking fitness test used was a modified version of the Bruce protocol, having three minute stages at given speeds and elevations. The first stage was at the subject's preferred pace and no elevation. The second stage was at 2.5mph and a 12% grade. Stage three was 3.4mph and a 14% grade. Stage four was 4.2mph and a 15% grade. Stage five was 5.5mph and a 15% elevation. Stage six was 6.2mph and a 15% elevation. At every minute into a stage, the subject was queried as to how hard they were working based on the Borg scale. At the end of every completed stage, subjects were asked to provide a blood sample for lactate testing. The protocol continued until the subject either felt discomfort or was unable to continue. Data was collected from the 100 volunteers and analyzed. Data from this study suggests that there is a low correlation between self-selected walking pace and fitness when monitoring for maximum oxygen consumption. Our study suggests that this method of testing is not reliable fitness determination method for large populations.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Health Sciences Section; 2nd place in undergraduate research competition)

URCPP Funded Research

DEPARTMENT OF PHYSICAL EDUCATION, HEALTH AND ATHLETICS

Financial success for the new private practice chiropractor. DAVID HERMAN and MARTHA BEAGLE, Department of Physical Education, Health and Athletics, Berea College, Berea, KY 40404.

Although clinical research is prevalent in chiropractic medicine, very little research exists on the business related aspects of chiropractic medicine and practice. Consequently, because business courses are limited in chiropractic education, a new chiropractor must establish and operate a private practice with limited business knowledge, often resulting in poor financial decisions. Therefore, the purpose of this study was to provide the new private practice chiropractor with optimal decisions that he or she can make enabling and guiding their financial success. Forty private practice chiropractors were contacted by telephone in Kentucky and Ohio with populations of 17,000 or less. A total research sample of ten chiropractors completed a structured survey of twenty-one questions using SelectSurveyASP Advanced software. Beginning in the 1970s, there has been a continual rise in the debt acquired from chiropractic school, from an average of \$25,000 to an average of \$144,000 in the 2000s. The average amount of money that the sample needed to begin their private practice was \$135,000. To cover their monthly expenses, the sample needed to earn an average of \$4,200. The sample overwhelmingly agreed that the three most important attributes to a private practice chiropractor's success were receptionists/office managers, billing and collection specialists, and massage therapists. The sample also felt that for a new chiropractor to succeed, he or she must purchase a chiropractic table, diagnostic instruments, an x-ray system, transcutaneous electrical nerve stimulation (TENS) unit, ultrasound unit, and a heat/cold therapy unit. The most successful advertisement mediums for recruiting new patients were patients' referrals and general word-of-mouth information. The overwhelming majority of the sample accepted some form of managed healthcare plan. On average, the sample was able to establish a self-sustaining private practice in three years. These findings will enable a new private practice chiropractor to make sound financial decisions.

Lethbridge Undergraduate Research Journal, Lethbridge, Alberta (Submitted for publication)

Project In PED 492

DEPARTMENT OF PHYSICS

Investigating the plausibility of blue straggler production without cluster dynamics. MATTHEW BAILEY¹, ROBERT D. MATHIEU² and AARON M. GELLER², ¹Department of Physics, Berea College, Berea, KY 40404 and ²Department of Astrophysics, University of Wisconsin, Madison, WI.

Simulations of binary evolution from the Zero Age Main Sequence to a chosen age were used to determine whether dynamical interactions between cluster stars are necessary to produce the variety of Blue Straggler Stars (BSs) observed. By comparing the nature of simulated BSs to observation and correlating these characteristics with specific formation pathways of mass transfer, we will be more apt to resolve whether BSs can form without considering cluster dynamics. A parent binary population of 10,000 stars was supplied with observed eccentricity and period distribution as given by Duquennoy & Mayor (1990) and then synthetically evolved. The Binary Evolution Algorithm (BSE), created by Jarrod Hurley, was set to an age of 7 Gyrs as to model the old open cluster NGC 188. BSs generated were then selected photometrically (by luminosities and B-V color) and the type of mass transfer producing the BS was identified. Geller et al. (2008) provided the observational results for NGC-188, finding 21 total BSs, 16 of which are in binaries. Surprisingly, 75% of observed BS binaries have periods near 1,000 days. Our simulation produced on average 18 ± 3 BSs, 10 of which were in binaries and 60% of those having periods near 1,000 days. The immediate conclusion is that for NGC 188, the quantity of BSs is within limits of BSEs production capability. Assuming our comprehensive model is accurate, if a binary has been evolving for 7 Gyrs then our simulation correlated BSs with periods near 1,000 days to production through wind accretion. This result suggests that cluster dynamics may not be necessary to account for the variety of observed BSs after all. This work was supported by the National Science Foundation's REU program and the Department of Defense's ASSURE program through NSF Award AST-0453442.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Physics and Astronomy Section;

1st place in undergraduate research competition)

University of Wisconsin Internship

DEPARTMENT OF PHYSICS

Numerical simulations on disordered classical spin systems. BRANDON BROWN, BRAD STEELE and MARTIN VEILLETTE, Department of Physics, Berea College, Berea, KY 40404.

By using the Monte Carlo Metropolis algorithm, we studied the effect of random magnetic fields on classical spin models such as the 2D XY model and the 3D Heisenberg model. It has been conjectured that in the presence of a random magnetic field that classical spin model can spontaneously order (J.Wehr et al., Phys. Rev. B 74, 224448 (2006)). Such a phenomena for the 2D XY model would occur when the magnetic field would vary in magnitude but would be uniaxial. In the 3D Heisenberg model the magnetic field vector would vary in strength but would be confined to a 2D plane. We confirm through numerical simulations that the system does indeed order at low temperature by analysis of the Binder cumulant. For the 3D model we showed that the system orders at a lower temperature in the presence of a random magnetic field.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Physics and Astronomy Section)

URCPP Funded Research

DEPARTMENT OF PHYSICS

Numerical simulations on disordered classical spin systems. BRANDON BROWN, BRAD STEELE and MARTIN VEILLETTE, Department of Physics, Berea College, Berea, KY 40404.

By using the Monte Carlo Metropolis algorithm, we studied the effect of random magnetic fields on classical spin models such as the 2D XY model and the 3D Heisenberg model. It has been conjectured that in the presence of a random magnetic field that classical spin model can spontaneously order (J.Wehr et al., Phys. Rev. B 74, 224448 (2006)). Such a phenomena for the 2D XY model would occur when the magnetic field would vary in magnitude but would be uniaxial. In the 3D Heisenberg model the magnetic field vector would vary in strength but would be confined to a 2D plane. We confirm through numerical simulations that the system does indeed order at low temperature by analysis of the Binder cumulant. For the 3D model we showed that the system orders at a lower temperature in the presence of a random magnetic field.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Physics and Astronomy Section)

URCPP Funded Research

DEPARTMENT OF PHYSICS

Laser ablation of diamond. W. D. NORRIS¹, D. M. GILMOUR¹, R. E. HAUFLER² and A. S. LAHAMER¹, ¹Physics Department, Berea College, Berea, KY 40404 and ²MDS Analytical Technologies, 71 Four Valley Drive, Concord ON, Canada L4K 4V8.

In 1996 the Nobel Prize in Chemistry was awarded for the discovery of Carbon 60 (C₆₀). The C₆₀, a hollow spherical molecule called a fullerene, was generated using laser ablation wherein a graphite target was vaporized with an Nd-YAG laser. Our research involves the laser vaporization of diamond in an argon atmosphere. The wavelength we used is the second harmonic (532 nm) of the Nd-YAG laser. Preliminary results indicate the generation of C₆₀ and higher fullerenes similar to those produced using a graphite target. However, lower mass clusters of carbon were also observed. The possible identification of the lower masses will be discussed.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Physics and Astronomy Section)

URCPP Funded Research

DEPARTMENT OF PHYSICS

Study of the period of variable star at Berea College Observatory. JIMMY ROP, RAMESH ADHIKARI, WILLIAM COLE and TRACY HODGE, Department of Physics, Berea College, Berea, KY 40404.

The Berea College Observatory consists of a computer driven 16" f/18 Ritchey-Cretien telescope equipped with a Santa Barbara Instrument Group (SBIG) ST-7 CCD camera. We have obtained images of the classic short-period variable star RR Lyrae through a Johnson V filter. After subtracting the dark frames and flat fielding the images, we performed relative photometry over images obtained on the nights of June 5th, 11th, 16th, 17th, 24th, 25th, July 1st, 2nd, 11th, 14th, 15th and 16th. We were able to accurately match the phase and amplitude of the historical light curve for RR Lyra obtained from the American Association of Variable Star Observers.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Oral Presentation – Physics and Astronomy Section; 2nd place in undergraduate research competition)

URCPP Funded Research

DEPARTMENT OF PSYCHOLOGY

Tell me a story: The effects of multiple stimuli on preschooler's memory and story preference.
ERRINN A. BIXBY, Department of Psychology, Berea College, Berea, KY 40404.

How much enrichment does a child need to remember a story most accurately? Twenty-seven children, ages 37 months to 60 months, were split into three groups: audio, audio and visual, and audio, visual, and artifacts. All the children were presented with the same story in groups of 3 or 4, and then they were questioned individually to test for recall. The children were questioned on the story again after a day delay. Age and level of enrichment were found to increase memory independently ($F(3, 23) = 7.011, p < 0.05$). An ANOVA reveals that children were more satisfied when they are able to see pictures and touch artifacts associated with the story, rather than just hearing the story ($F(2, 27) = 5.559, p = 0.01$) but age did not affect expressed satisfaction. A multiple linear regression reveals that there is a significant interaction between age and gender at all levels of enrichment ($F(4, 22) = 9.561, p < 0.001$). Memory increases in males as age increase. However, memory decreases for females as age increases.

2009 Mid-South Psychology Conference, February 14, 2009, Lambuth University, Jackson, Tennessee (Paper Presentation)

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

The effects of physical appearance and subjective description on rated likability. SAMANTHA BUCHANAN, Department of Psychology, Berea College, Berea, KY 40404.

This study focused on the issue of individual likability. Does likability encompass only physical appearance or does it also take into account character traits? Fifty-six students, 47 females and 9 males, viewed a slide show that contained 4 images (attractive female, unattractive female, attractive male, unattractive male), each paired with a character description (extremely positive, positive, negative, extremely negative). Participants were instructed to rate each slide on a scale from 1 (extremely unlikable) to 9 (extremely likable). A significant main effect was found for attractiveness level, $F(3, 55) = 17.433, p < .001$, and character description, $F(3, 55) = 56.404, p < .001$. However, since the interaction between these two variables was not significant, these two influences can be assumed to operate independently of one another.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Psychology Section)

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

To tell the truth: The effects of viewer and presenter personal political preferences on perceptions of sincerity. JOHN DAMRON, Department of Psychology, Berea College, Berea, KY 40404.

This study examined the effects of viewers' and speakers' personal political preferences on the perceived sincerity of public speech. Participants were polled for their political preference (Obama, McCain, or Clinton), then asked to view six short videos. A total of three speakers were seen talking about two of the three major candidates. A 2x2 repeated measures ANOVA showed a significant interaction between viewer's preference and the speaker's preference. Viewers could only discern the speaker's sincerity when the subject of the talk was not their own preferred candidate.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Psychology Section)

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

Above Average Effect (AAE): The link between knowledge, focalism, and comparative judgments. ANTHONY HOLMES Berea College, Berea, KY 40404.

Have you ever compared yourself to another individual? There is a natural tendency to overestimate one's own achievements and capabilities; this is called the Above Average Effect (AAE). This study focuses on two of the comparative biases that influence the AAE: knowledge and focalism. This study systematically varied the behavioral base rates of public and private behaviors reported to subjects then asked them to consider indicate the frequency of their own behaviors. Responses from 40 Berea College students showed that the Above Average Effect increased for lower anchoring information and decreased for higher anchoring information. Contrary to theoretical predictions, public rather than private behaviors showed a greater Above Average Effect. Females were found to display the AAE to a greater extent than males. Each of these three main effects were independent of the other two.

2009 Mid-South Psychology Conference, February 14, 2009, Lambuth University, Jackson, Tennessee (Poster Presentation)

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

Robbers Cave revisited: The effects of race and instructions on implicit and explicit measures of racial prejudice. BRIAN OWENS, Department of Psychology, Berea College, Berea, KY 40404.

Sherif's Robber's Cave Experiment (1961) established that cooperation increased positive attitudes between members of different groups while competition increased inter-group hostility. The present study sought to extend Sherif's classic findings to race relations and individual prejudice. Mixed and same race dyads cooperating or competing in the accomplishment of a Sudoku Puzzle, Minesweeper, and Blockhead!® did not appear to affect subjects' prejudice by as measured by standard survey of explicit prejudice. However, examination of the effect of these variables on racial prejudice as measured by the Harvard Implicit Attitudes Test showed a significant influence on subjects' racial preferences (i.e., prejudice) as predicted by Sherif's theory.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Psychology Section)

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

The effects of gender and condition on fifth graders' block stacking performance. LACEY OWENS, Department of Psychology, Berea College, Berea, KY 40404.

This study examined the effects of gender and cooperative or competitive situations on student performance, failure rates, and satisfaction. Twenty-nine males and thirty one female fifth graders were randomly assigned to competitive or cooperative same sex groups to perform a block-stacking task for 10 minutes. Multiple regression analysis and ANOVA indicated that gender and condition interacted significantly: males in the competitive situation outperformed all other groups. Significant main effects for males and the competition condition were also found in the analyses of variance of the number of failures and the total number of blocks stacked. No significant results were found for students' satisfaction. Implications for education will be discussed.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Psychology Section)

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

Sometimes you can't win for losing; The effect of stereotype threat on Sudoku performance.
DANIELLE PELENKAHU, Department of Psychology, Berea College, Berea, KY 40404.

Stereotype threat refers to people feeling that they are at risk of confirming that they possess the same negative traits as a group to which they belong. This study examined the effects of stereotype threat induction on the level of performance on a Sudoku puzzle. Thirty-seven participants were asked to read one of two different paragraphs, one stating that the participant's gender did worse on Sudoku puzzles than the opposite gender or a paragraph that was neutral. Subjects were then given twenty minutes to try to complete a Sudoku puzzle. Using a one-way ANOVA, significance was found when comparing the paragraph presented and Sudoku puzzle performance; the stereotype threat condition appeared to suppress performance for all subjects ($F(1, 36) = 4.984, p = .041$).

*94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008,
University of Kentucky, Lexington, Kentucky (Poster Presentation – Psychology Section)*

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

The effect of object familiarity and time on incidental recall. JULIA UL PRICE, Department of Psychology, Berea College, Berea, KY 40404.

Bartlett's *War of the Ghost* showed how memory decays over time. Prior experience affects what is perceived and how it is retained. The present study investigated whether familiar objects are more easily remembered than foreign objects. Thirty-eight students between the ages of 18-22 observed a room with 54 diverse objects. At time that varied from minutes to over a week, memory was measured by an electronic survey of 32 questions. Familiar objects were found to be more memorable than foreign objects and memory for both types of objects was found to decay over time. However, the evidence for the anticipated interaction between these two independent variables was not found.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Psychology Section)

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

Read'n, rite'n and residue; Using the Cloze Procedure to explore the persistence of memory.
MEGAN RODGERS, Department of Psychology, Berea College, Berea, KY 40404.

Reading and writing are foundations of education. However, it is not clear that these activities leave behind the same cognitive residue (i.e., memory). This study used the cloze procedure to measure subjects' memory of read and written samples (of about 200 words) after one week and five weeks. Fourteen Berea College freshmen in a single section of a required general studies course participated. Students were better able to fill in removed words when they had written the sample than when they had read it. Also, the participants scored higher on the samples after one week compared to five weeks. An interaction was also found showing that participants could correctly produce missing words for the sample that they had written with minimal decay even after five weeks. However, for the previously read samples, memory scores decayed to baseline within five weeks. Cognitive and educational implications as well as potential applications for detecting academic dishonesty will be discussed.

2009 Mid-South Psychology Conference, February 14, 2009, Lambuth University, Jackson, Tennessee (Paper Presentation)

Psychology 424: Senior Research

DEPARTMENT OF PSYCHOLOGY

Predicting academic success in the third semester. MEGAN RODGERS, KALEIGH MCCOY, BOZHIDAR BASHKOV and ANGELA SUTTON, Department of Psychology, Berea College, Berea, KY 40404.

A database containing over 150,000 cells, included demographic information, academic performance, attitudinal survey responses and key characteristics of two first-year general studies courses for all students who entered Berea College in the fall of 2006. This database provided the foundation for a systematic exploration of the predictors of student retention and academic success. The researchers discovered that grades in the two general studies course predicted more than half of the variance in retention. Researchers also assess approximately 20 different syllabi for each of the two general studies courses on 5 separate dimensions. Academic success was measured by the weighted average grades of courses taken during students' third semester. Five variables combined to predict 34% of the variance in academic success. Two interactions involving syllabi ratings from the first year and academic performance during the first year were found to be significant. A single variable, which contained high school GPA and a standardized ACT score, was the only significant demographic influence. Examination of the general path analytic model reveals that student performance during the first year was far more important than demographic variables in predicting students' retention and subsequent academic success.

94th Annual Meeting of the Kentucky Academy of Science, October 31 - November 1, 2008, University of Kentucky, Lexington, Kentucky (Poster Presentation – Psychology Section; 2nd place in undergraduate research competition)

2009 Mid-South Psychology Conference, February 14, 2009, Lambuth University, Jackson, Tennessee (Poster Presentation)

URCPP Funded Research

DEPARTMENT OF TECHNOLOGY AND INDUSTRIAL ARTS

Engineering a human power/electric hybrid commuter vehicle. GEORGE SHEA, NOAH MCGRAW, CHRISTOPHER DUEKER and BRAD CHRISTENSEN, Department of Technology and Industrial Arts, Berea College, Berea, KY 40404.

Research focused primarily on the design of lightweight and low cost vehicles appropriate for short distance commuting that provide reasonable comfort and safety with protection from inclement weather. Keeping within the parameters of a “moped” classification limited the power to 1500 watts (2 horsepower) and 30 mph top speed. Predictive analysis indicated that at a gross weight of 750 pounds, the vehicles would need 1668 watts to climb a 5% grade, 234 watts to overcome wind drag at 22 mph, and 1668 watts to accelerate at 1 m/s/s. An average non-athletic human can deliver 300 watts for about 10 minutes. The design and construction of four prototypes proved helpful for determining a number of design ideas. First, weight is not the most critical factor, but is a major design consideration. Second, the pedals pose many challenges to the designer. Third, further development is needed in the formation of the body of the vehicle. Fourth, further research is needed in the design of the electrical circuits of the vehicles. Finally, there is one barrier to the widespread use of human/electric hybrid vehicles that cannot be overcome mechanically. That is one of perception. A human/electric hybrid vehicle is simply not acceptable. Pedal cars are seen only as a child’s toy, hardly worthy of serious consideration as a transportation device. Through research, design, and construction work completed during this project, it has been determined that a simple, low cost commuter vehicle powered by pedals and electric motors is possible. They are, however, difficult to design and build. There are a number of design considerations that are not initially apparent. Also, they are likely to be met with opposition by the public.

URCPP Funded Research

DEPARTMENTS OF WOMEN'S STUDIES & HISTORY

Restoring the Oliver Street Community School: History and Preservation. ENCHANTA JACKSON, JUSTIN CORNELISON, LINDA STRONG-LEEK¹ and DWAYNE MACK²,
¹Department of Women's Studies, ²Department of History, Berea College, Berea, KY 40404.

Founded in the 1880's by freed Blacks in Winchester, Kentucky, the Oliver Street Community School stands as a monument to early African American history in the State of Kentucky. Currently listed on the National Register of Historic Places, the Oliver Street Community School's history remains an important part of both the physical and psychological landscapes of Central Kentucky. The purpose of this summer study was to research the history of the Oliver Street Community School by reviewing public records, such as deeds, wills, county and state records, and school board records, to understand the impact of the school on Black life in Winchester prior to desegregation of schools in the United States. The research team also interviewed students who attended and graduated from the Oliver Street Community School, including one 1944 graduate, and, to date, one of the three living teachers who taught at the school. The information from this project will be presented at an annual history conference, and we plan to write a paper highlighting the significance of the Oliver Street Community School.

URCPP Funded Research