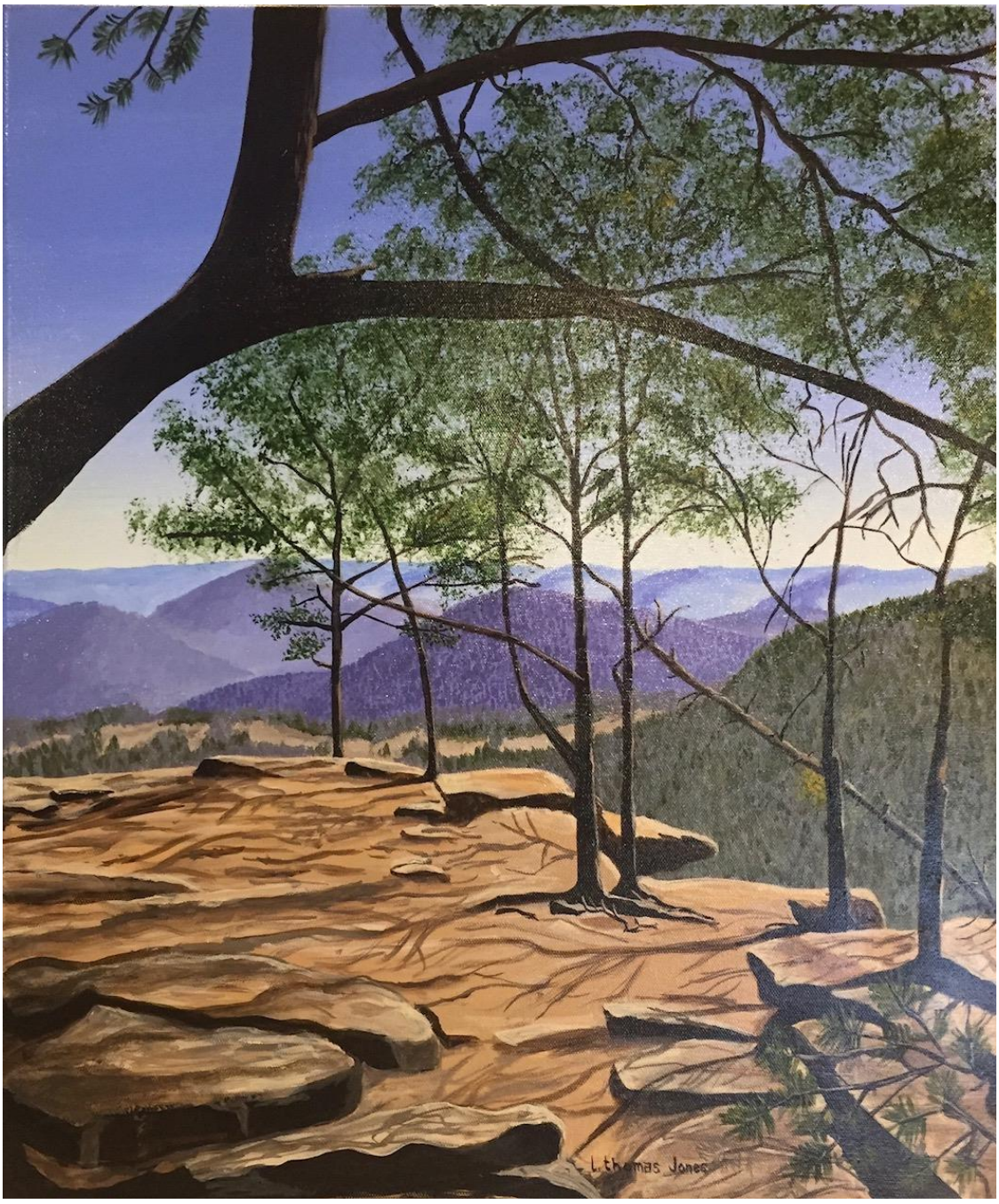


Berea College Undergraduate Research Abstract Journal 2017

INTRODUCTION

Editors: Marah Zeidan (Senior Biology Major); Ronald B. Rosen (Professor of Biology)

This twelfth (2017) issue of the "Berea College Undergraduate Research Abstract Journal" is dedicated to the memory of two international students, **Dzhoana Veneva Ivanova** and **Enkhjin Enkbold**, who were tragically taken from our Berea College Community and their families by an auto accident last fall. Abstracts from both of their research projects are included among the 57 abstracts representing majors from 13 different Berea academic programs this year including Art and Art History {1}, Biology {17}, Chemistry {12}, Child and Family Studies {1}, Communications {1}, Computer Science {2}, Education Studies {1}, Health and Human Performance {2}, Mathematics {2}, Nursing {1}, Physics {7}, Psychology {9} and Technology and Applied Design {1}. Twenty-five (44.6%) of these abstracts represent research conducted on-campus with Berea College Faculty mentors. The common theme to the research presented in these abstracts is that the: (1) original proposal was peer-reviewed and/or (2) work was subsequently presented by undergraduates at on and/or off-campus meetings. Several projects were funded by academic programs; most on-campus research was made possible with funds provided by Berea College's Undergraduate Research and Creative Projects Program (URCPP). Off-campus projects were funded by academic institutions throughout the country often with assistance from Berea College's Office of Internships and Career Development. Many of these projects were presented on-campus during the 17th Berea Undergraduate Research Symposium (BURS) on October 20, 2017. A number of these projects were subsequently presented at the 103rd Annual Meeting of the Kentucky Academy of Science at Murray State University (26 presentations and 11 awards). If known, presentations, awards received and funding sources are noted below each abstract. Images of student participants are included if available.

ACKNOWLEDGEMENTS

This publication would not have been possible without the support of many people. We would like to thank Chad Berry, Academic Vice President and Dean of the Faculty, for providing funds to print hard copies of these abstracts, Esther Livingston for arranging funding from the Berea College Office of Internships and Career Development and Sarah Broomfield for coordinating the URCPP initiative on our campus. Gratitude is extended to Berea College faculty for their mentorship, and of course to students whose exemplary work is reflected in this journal. Additionally we would like to acknowledge Lisa Thomas Jones (Mathematics Major – Class of 1983), for the original cover art. Finally, we would like to thank all the off-campus mentors at the following institutions/organizations for supporting Berea students during the summer of 2017 (number of Berea students in brackets): Alaska Sealife Center {1}, Eastern Kentucky University {1}, Duke University {1}, Foundation for Surgical Innovation and Education, Portland, Oregon {1}, Indianapolis Zoo {1}, Johns Hopkins University {1}, Lebanese American University, Beirut, Lebanon {1}, National Institute of Health, Bethesda, Maryland {1}, Summit Engineering, Lexington, Kentucky {1}, University of Colorado Denver {1}, University of Florida {1}, Universities of Indiana and Purdue {1}, University of Kentucky {5}, University of North Carolina {1}, University of Wisconsin, Madison {1} and Vanderbilt

University {10}. Special thanks to Berea alumni including Drs. Dennis Roop (University of Colorado, Denver) and Rocky Tuan (University of Pittsburgh), and Vanderbilt University faculty Drs. Julie Hudson, Billy Hudson and Roy Zent for facilitating research opportunities at their respective institutions for Berea College students. We continue to be deeply indebted to Berea College alumnus, Dr. Hal Moses, who was instrumental in establishing our valued relationship with Vanderbilt University.

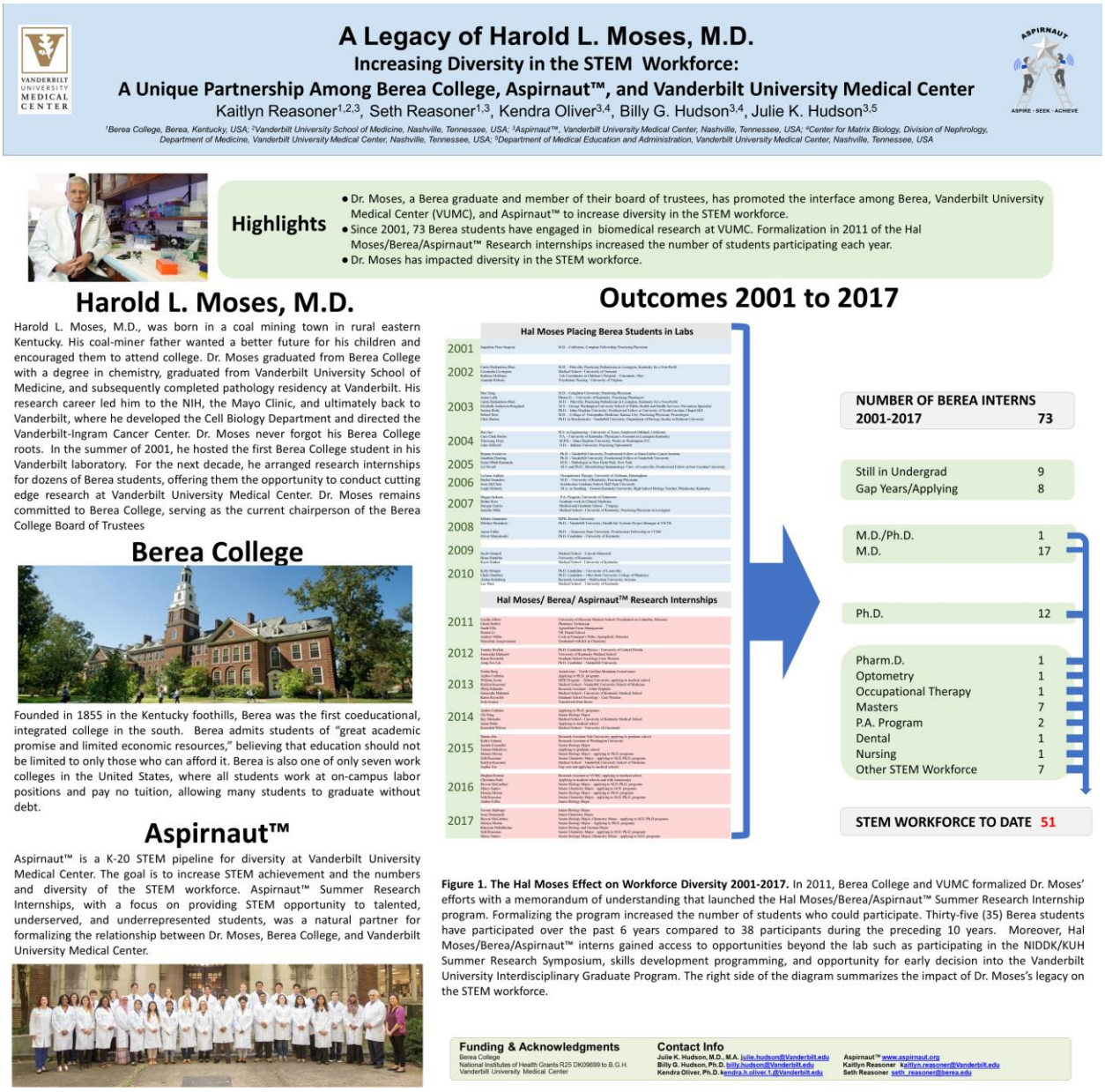
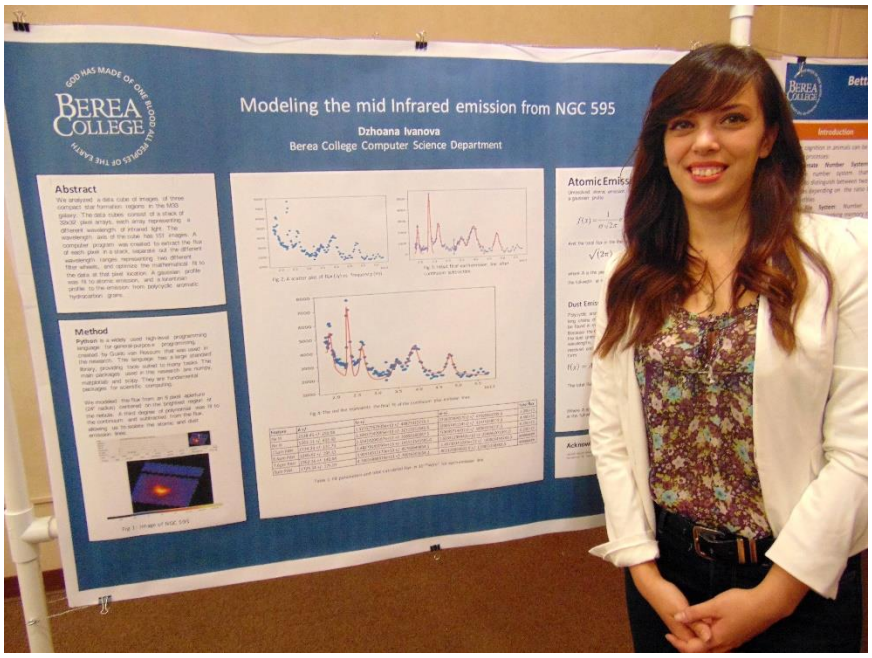


Figure 1. The Hal Moses Effect on Workforce Diversity 2001-2017. In 2011, Berea College and VUMC formalized Dr. Moses' efforts with a memorandum of understanding that launched the Hal Moses/Berea/Aspirnaut™ Summer Research Internship program. Formalizing the program increased the number of students who could participate. Thirty-five (35) Berea students have participated over the past 6 years compared to 38 participants during the preceding 10 years. Moreover, Hal Moses/Berea/Aspirnaut™ interns gained access to opportunities beyond the lab such as participating in the NIDDK/KUH Summer Research Symposium, skills development programming, and opportunity for early decision into the Vanderbilt University Interdisciplinary Graduate Program. The right side of the diagram summarizes the impact of Dr. Moses's legacy on the STEM workforce.



Dzhoana Vaneva Ivanova

May 31, 1994—October 27, 2017

Enkhjin Enkhbold

August 27, 1996—November 1, 2017

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9. **The Impact of Lysine Acetylation on Glyxoalase II Activity. James Bryson McCarthey**[1] and Jim Galligan[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

10. **Biology of the Cercaria of *Leuceruthrus micropteri* (Trematoda: Azygiidae) Recovered from the Snail, *Pleurocera semicarinata*. Chi Peng**, **Hanna Abe**, **Ron Rosen**, **Brian Traw**, **Emma Reasoner** and **Marah Zeidan**. Biology Department, Berea College, Berea, Kentucky, 40404.

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Chemistry Department

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22. **Targeting Proteolytic Activity Using Protease Inhibitors as Natural Therapeutics for Human Metapneumovirus (HMPV). Amber Earlywine**[1], Tyler Kinder[2] and Rebecca Dutch[2]. [1] Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]University of Kentucky College of Medicine, Lexington, Kentucky, 40506.

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27. **Characterization of Host-Pathogen Interactions During Early Stage Chikungunya Virus Infection. Seth Reasoner**[1] and Manuel Ascano, Jr[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

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29. **Synthesis of Poly(4-hydroxystyrene) by Living Anionic Polymerization for Block Copolymer Lithography. Beau Schweitzer**[1], Koei Azuma[2] and Padma Gopalan[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]University of Wisconsin-Madison, Madison, Wisconsin, 53706.

30. **Synthesizing Cleavable Acetal Antibody Drug Conjugates**. **Sarah Tabor, Michael James** and **Elizabeth Thomas.** Chemistry Department, Berea College, Berea, Kentucky, 40404.

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Communications Department

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51. **Staying Behind: The Effect of Stereotype Threat on Unhelpful Perseverant Behaviors. Aaron Clark** and **Dave Porter**. Psychology Department, Berea College, Berea, Kentucky, 40404.

52. **The Effects of Gender, Task Difficulty, and Emotional Arousal on Perceptual Sensitivity. Enkhjin Enkhbold** and **Dave Porter**. Psychology Department, Berea College, Berea, Kentucky, 40404.

53. **Implicit Gender Bias, Commercials, and Cooperation. Rick Holland.** Psychology Department, Berea College, Berea, Kentucky, 40404.

54. **Mashrou3 Insan (The Human Project): A Participatory Action Research Project on Displaced Youth's Mental Health and Well-Being. Khawla Nasser Al Deen**[1] and Samar Zebian[2]. [1]Psychology Department, Berea College, Berea, Kentucky, 40404. [2]Lebanese American University in Beirut and NAHNOO Organization, Beirut, Lebanon.

55. **Let's Face It: The Effects of Disclosure Type and Modality on Student Comfort. Caitlin Taulbee** and **Wendy Williams**. Psychology Department, Berea College, Berea, Kentucky, 40404.

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Technology and Applied Design Department

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Appendix

58. 17th Annual Berea College Undergraduate Research Symposium Photos

59. 103rd Annual Meeting of the Kentucky Academy of Science Photos

A Study of George White through Flight and Light. Annie He, Samantha Sise, Alicia Crocker, Bianca Godden, Broughton Anderson, Matt Jadud and Scott Heggen. Art and Art History Department, Berea College, Berea, Kentucky, 40404.

Abstract

Imaging is a critical part of the archaeologist's toolkit. Likewise, the capture, manipulation, enhancement, and interpretation of images has been the subject of significant research in computing over the past 20 years. This project brought together five students studying archaeology and computing to collaborate on fieldwork—and the hardware and software that supports that fieldwork—to engage in an exploration of the life of George White, a freed slave and property owner in Madison and Jackson counties during the mid- to late-19th century, that would otherwise be impossible undertaken separately. This interdisciplinary research project relied on macro-scale, overhead drone images of sites as well as high-resolution, micro-scale RTI dome images of excavated artifacts. George White's story will add a new dimension to our understanding of the lives of freed blacks in the 19th century in Madison County and add to the growing database of significant archaeological resources located within the Berea College Forest. More broadly, this research will contribute to a greater understanding of how enslaved individuals in Kentucky purchased their freedom and established themselves as property owners in an unstable pre-Civil War world.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Funded by Berea College URCPP

***Triops cancriformis*: A Potential Non-Mammalian Animal Model for Studying the Mechanisms of Kidney Ultrafiltration.** Favour Akabogu[1] and Kendra Oliver[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

Abstract

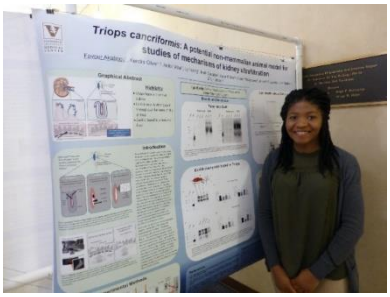
The ultrafiltration barrier of the kidney contains a basement membrane (BM) positioned between endothelial cells and podocytes. Several kidney diseases such as diabetic nephropathy, Alport syndrome and Goodpasture's disease, demonstrate abnormalities in the BM but the mechanism remains obscure. We sought to characterize *Triops cancriformis*, as a non-mammalian animal model for the study of these mechanisms. Pilot studies suggest that *Triops* maxillary gland is a primitive kidney with an ultrafiltration barrier and anatomical features similar to vertebrates. Herein, we sought to further characterize the BMs of *Triops* with a focus on collagen IV(Col4), a principal constituent of all BMs. We hypothesized that Col4 occurs in the maxillary gland, as well as other organs and tissues. We focused on the noncollagenous domain (NC1) of Col4 and *Triops* were dissected to determine regional distribution. Collagenase digests were analyzed by SDS-PAGE and JK2 antibody. Results revealed a band that was evenly distributed throughout the *Triops* but migrated higher than expected. To determine if Col4 occur in a hexamer configuration under native conditions, samples were analyzed by fast protein liquid chromatography(FPLC). Our results indicated that the Col4 NC1 domain behaves as a hexamer under native conditions, yet, upon dissociation, the subunits behaves distinctly different from mammalian NC1 domains. Our findings suggest that Col4 is distributed throughout the tissues of *Triops*, including those that contain the maxillary gland. *Triops* represent a tractable animal model for investigating Col4 scaffolds, particularly related to the role of the Col4 smart scaffold in kidney ultrafiltration in health and disease. Research supported by NIH R01 DK18381 to B.G.H, This work was also supported by the KUH (R25DK096999) Undergraduate Research Internships on the Pathobiology of Diabetic Nephropathy and the R25 Supplemental Travel Funds; Berea/Aspirnaut™/Hal Moses Summer Research Internships, Vanderbilt University Medical Center and Center for Matrix Biology.

KUH Summer Undergraduate Research Conference, August 2-4, 2017, Bethesda, Maryland (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

American Society of Nephrology Annual Meeting, November 2-4, 2017, New Orleans, Louisiana (Poster Presentation)

Funded by National Institute of Diabetes and Digestive and Kidney Diseases R25 DK09699, Hal Moses/Aspirnaut Research Internship and Vanderbilt University and Berea College Office of Internships and Career Development



Influence of Reclaimed Surface Mine Landscape on Bees and Plant-Pollinator Networks in Southeastern Kentucky. Hannah Carter[1] and Valerie Peters[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Eastern Kentucky University, Richmond, Kentucky, 40475.

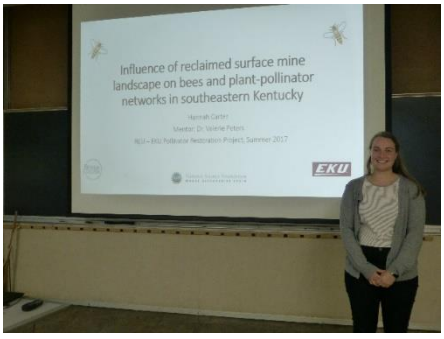
Abstract

Surface mining dramatically alters the landscape due to the removal of large amounts of sediment to access seams of coal which runs through a mountain. In post-mined landscapes, reclamation efforts are often conducted to modify the otherwise unused landscapes. Reclamation sites are increasing in number due to the decreasing demand for mining operations. Few studies have measured bee abundance and richness in the Appalachian region, particularly southeastern Kentucky. The aim of our study was to understand how the number of bee species, bee abundance, and plant-pollinator networks respond to surface mining and reclamation in southeastern Kentucky. The study was conducted by collecting populations of plants and bees from eleven field sites located in southeastern Kentucky. During this study we collected a total of 188 bee specimens, representing 47 species, foraging on 13 flower species. In summary, we observed a marginally significant difference between the number of plant species on sites, based on the presence or absence of a surface mine ($F_{1,9}=4.12$, $p=0.07$). Therefore, sites without surface mines nearby tended to have more species of plants compared to sites with surface mines nearby. Furthermore, bee abundance and richness was significantly influenced by the number of plant species at each site ($F_{1,8}=26.64$, $p= 0.00086$ and $F_{1,8} = 17.37$, $p = 0.003$), but was not directly affected by the presence or absence of a surface mine alone ($F_{1,8}=0.0006$, $p=0.98$ and $F_{1,8}=2.99$, $p= 0.12$). It was concluded that there was a strong trend in our data set: the network suggests there are several more bee and plant species located on sites without surface mines. Although we did not find a statistical difference between the number of bees or the number of bee species on sites with and without mines, there was a trend toward higher numbers of bee species on sites without surface mines. Plant-pollinator networks comparing the two types of sites, further elucidate differences between the two, showing a much greater diversity of interactions and a higher evenness of interaction on sites without surface mines nearby. This shows that sites without surface mines nearby have more resilient plant-pollinator networks that would be less vulnerable to disturbance.

Eastern Kentucky REU Symposium, Disturbance Ecology in Central Appalachia, July 26, 2017, Eastern Kentucky University, Richmond, Kentucky (Oral Presentation-SDisturbance Ecology)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Funded by National Science Foundation and Eastern Kentucky University



The POGIL Approach to Teaching. Lucas Collett, Miguel "Justin" Valdes and Megan Hoffman. Biology Department, Berea College, Berea, Kentucky, 40404.

Abstract

POGIL, or Process Oriented Guided Inquiry Learning, is a learner-centered method of teaching. POGIL activities strive to imbue students with useful process-based skills, including effective teamwork, communication, and problem-solving. The guided inquiry aspect of POGIL uses a learning cycle that scaffolds knowledge and encourages the students to build their own understanding. In addition to process skills and personally-constructed understanding, another focus of POGIL is to encourage students to use metacognition, i.e. the awareness and understanding of one's thought processes. The POGIL approach is achieved by designing activities based on information-rich models that are explored through carefully-crafted questions. The main goal of the summer project was to create new POGIL activities, while revising others. A series of POGIL activities were developed that focus on aerobic cellular respiration, a pivotal concept in introductory biology. The process of developing and writing the activities will be presented, along with accompanying challenges and future plans.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Science Education Section: 2nd place Undergraduate Research Competition)

Funded by Berea College URCPP

Factors Affecting the Diversity of Stream Salamanders in Two Watershed Systems in Central Kentucky. Hannah Elliot, Muntathar Alshimary, Rebecca Klem, Jeremy Wilde and Roy Scudder-Davis. Biology Department, Berea College, Berea, Kentucky, 40404.

Abstract

The Cumberland and Kentucky River watersheds come into close proximity near Berea Kentucky. Both of these watersheds have diverse salamander populations. The purpose of this investigation was to examine stream salamander diversity between the watersheds, and to investigate possible causes for any differences in salamander diversity. Stream salamander diversity did not differ between watersheds, but did differed between habitats with different levels of human disturbance. Streams in non-disturbed habitats in both watersheds had four or five salamander species. Streams in disturbed habitats had only one species. The differences in salamander diversity between streams in non-disturbed and disturbed habitats does not seem to be related to water quality. An analysis of water quality in terms of chemical pollutants and macroinvertebrate fauna indicated that the water quality in all of the streams was very similar. Differences in water quality indicators were evident in the number and diversity of macroinvertebrate species present, dissolved oxygen content, and conductivity. It is unclear at the moment how these parameters might influence salamander diversity. Further analysis of the data is being conducted to look for patterns in the levels of these parameters in relation to salamander diversity and abundance.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Oral Presentation-Ecology and Environmental Science Section: 2nd place Undergraduate Research Competition)

Funded by Berea College URCPP

Hepatitis C Virus Entry Inhibitor Aryloxazole Modulates Autophagy. Jazmin M. Escamilla[1], Zongyi Hu[2] and Jake Liang[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Liver Disease Branch, National Institute of Diabetes and Digestive and Kidney Diseases, National Institute of Health, Bethesda, Maryland, 20814.

Abstract

Autophagy degrades and recycles cytosolic components and plays a role in the pathogenesis of various diseases including Hepatitis C virus (HCV) infection. HCV can activate the autophagic process which is involved in the replication of HCV. Using high throughput screening, a novel small molecule with aryloxazole moiety (designated as chemotype 6, CT6) was identified as a potent HCV inhibitor. Functional studies demonstrated that CT6 targets HCV at late entry stage (trafficking) of the viral life cycle. We hypothesized that CT6 may interfere with viral trafficking and thus block HCV entry by the modulation of cellular autophagic process. HCV permissive Huh7 cells in culture were used for the study of autophagy modulation. Transfection of autophagy protein plasmids, fluorescent confocal microscopy, and western blot for detecting autophagy marker protein LC3 were used to study the autophagy modulation properties of CT6. Huh7 cells transfected with LC3-RFP and treated with green fluorescent dye bodipy-labelled CT6 showed colocalization of CT6 with LC3. CT6 treatment significantly increased the level of LC3-II in a dose dependent manner. CT6 treatment also appeared to block LC3-II degradation. CT6 appears to modulate autophagy in Huh7 cells through blocking autophagosome fusion with the lysosome. Future studies will characterize the inhibition mechanism of HCV entry by aryloxazole.

National Institute of Health Liver Disease Branch Meeting, July 28, 2017, Clinical Center, Bethesda, Maryland (Oral Presentation)

Summer Poster Day, August 10, 2017, Natcher Conference Center, National Institute of Health, Bethesda, Maryland (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Oral Presentation-Cellular and Molecular Biology Section)

Funded by National Institute of Health NIDDK (National Institute of Diabetes and Digestive and Kidney Diseases)

Identifying Genetic Modifiers in a *Drosophila* Model of Inclusion Body Myopathy. Amber Follin[1], Kyla Britson[2] and Thomas Lloyd[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Johns Hopkins School of Medicine, Baltimore, Maryland, 21205.

Abstract

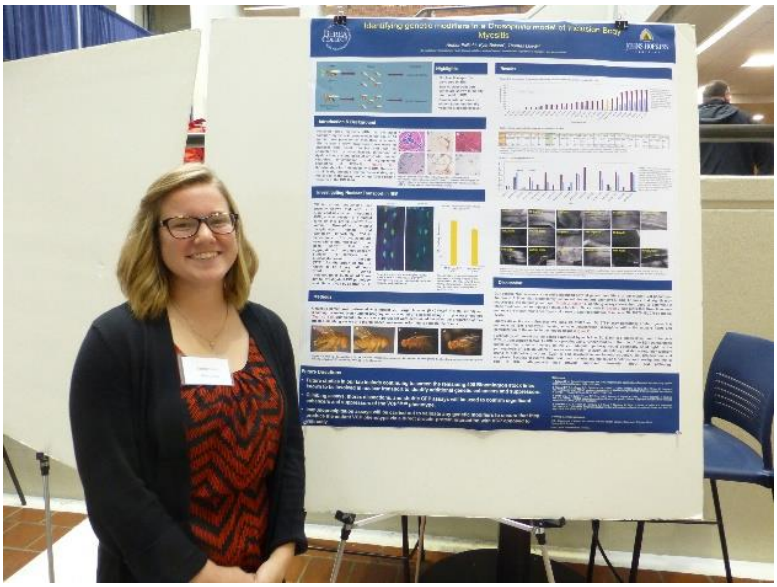
Inclusion body myopathy (IBM) is the most common myopathy in people over the age of 50. It causes slow progressive muscle weakness and is characterized by vacuolization, mitochondrial dysfunction, endomysial inflammation, and cytoplasmic deposition of TDP-43. Recently, whole exome sequencing has shown that valosin-containing protein (VCP) is a significant risk factor in sporadic forms of IBM. In addition, mutations in VCP are known to cause a hereditary form of IBM associated with Paget's disease and frontotemporal dementia (IBMPFD). To better understand the disease pathology of IBM, the Lloyd lab expresses a mutant form of this gene in *Drosophila*, which recapitulates human IBM pathology. Importantly, this model shows TDP-43 depositions in the cytoplasm, and it has been shown that such aggregations are sufficient to interfere with nuclear cytoplasmic transport (NCT). As disruption of NCT is a key pathologic event in other TDP-43 proteinopathies, such as ALS, the purpose of this study was to identify if IBM pathology was driven by aberrant NCT. A genetic screen using Bloomington *Drosophila* lines and a mutant VCP line was performed, as well as subsequent climbing assays and thorax dissections. Two Bloomington lines contained genes that enhanced the IBM phenotype; future investigation into the NCT genes of each line may shed light on their role in IBM pathogenesis.

Johns Hopkins C.A.R.E.S. Symposium, August 4, 2017, Johns Hopkins Medicine, Baltimore, Maryland, (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Cellular and Molecular Biology Section)

Funded by U.S. Department of Health and Human Services Health Careers Opportunity Program Grant Number D18HP29037



Measurement of Influenza Severity in Tennessee Hospitalized Patients, 2016-2017. Allison Harper[1], Tiffanie Markus[2], Gail Hughett[2], Danielle Ndi[2], Karen Leib[2] and H. Keipp[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

Abstract

Vanderbilt University Medical Center's (VUMC) Emerging Infections Program (EIP), as well as the Tennessee Department of Health, collaborates to report yearly seasonal flu cases to the Centers for Disease Control and Prevention (CDC). Previous studies that have been conducted among the EIP Influenza Sites have recognized the positive correlation between clinician testing and rates of hospitalization observed by sites and the fact that testing varies from site to site. Therefore, testing for influenza is often underutilized due to poor reliability of rapid test results and/or greater reliance on clinical diagnosis for influenza (CDC 2016). This experiment was designed to collect data on the chosen variables of the hospitalized patient that may be used to generate an influenza severity score. The influenza severity score would be able to provide the community and hospitals with an efficient process to prioritize the admission of the most severely ill patients. The experimental design included abstracting data from the electronic data records, scribing the selected variables on Redcap for each patient, and analyzing the results using statistical software (SAS). Subsequently, the measurements of the processes for collecting the feasibility of the obtained patient's variables, and the time efficiency for the chart reviewer to complete each case were evaluated. The experimental pilot takes into account only a subset of the 2016-2017 flu population, therefore no true correlations can be created.

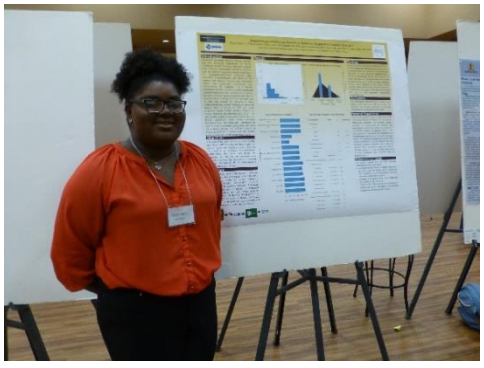
Vanderbilt University Undergraduate Research Symposium, August 3, 2017, Vanderbilt University, Nashville, Tennessee (Poster Presentation)

Tennessee Emerging Infections Program (EIP) Scientific Day, October 17, 2017, Vanderbilt University, Nashville, Tennessee (Poster Presentation-Health Sciences Section)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Health Sciences Section)

Funded by Berea College Office of Internships and Career Development and Vanderbilt University



The Impact of Lysine Acetylation on Glyxoalase II Activity. James Bryson McCarthey[1] and Jim Galligan[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

Abstract

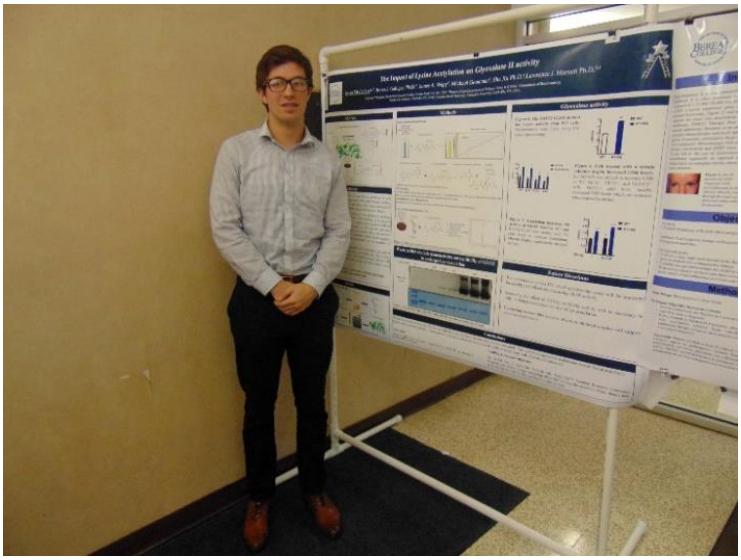
Glyoxalase II (GLO2) is the second enzyme in the glyoxalase pathway which detoxifies the glycolytic by-product, methylglyoxal. Specifically, GLO2 hydrolyzes S-D-lactoylglutathione (LGSH) to restore mitochondrial glutathione and generate D-lactate. Our recent data suggest a major role for GLO2 in the regulation of cellular glutathione (GSH). Further, a recent proteomic investigation has revealed K116 and K229 to be acetylated. The goal of this project was to understand the role of K116 and K229 acetylation in the regulation of mitochondrial GSH. The importance of K116 and K229 were explored using site directed mutagenesis. PCR products were verified using gene sequencing and protein was overexpressed using a baculovirus expression vector in SF9 insect cells. Purified K116Q (an acetylation mimetic) and WT GLO2 were incubated with dilutions of acetic anhydride to promote acetylation. Western blotting for acetylated Lys residues was then performed, demonstrating a dose-dependent increase in acetylation. To measure GLO2 activity, product formation (GSH) was derivatized with (5,5'-dithio-bis-[2-nitrobenzoic acid] to produce a change in UV absorbance at 412 nm. A significant change in activity was observed at high acetic anhydride concentrations, suggesting a role for Lys acetylation in the regulation of GLO2 and cellular GSH.

KUH Summer Undergraduate Research Conference, August 2-4, 2017, Bethesda, Maryland (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

American Society of Nephrology Annual Meeting, November 2-4, 2017, New Orleans, Louisiana (Poster Presentation)

Funded by NIH, NIDDK, Vanderbilt University and Berea College Office of Internships and Career Development



Biology of the Cercaria of *Leuceruthrus micropteri* (Trematoda: Azygiidae) Recovered from the Snail, *Pleurocera semicarinata*. Chi Peng, Hanna Abe, Ron Rosen, Brian Traw, Emma Reasoner and Marah Zeidan. Biology Department, Berea College, Berea, Kentucky, 40404.

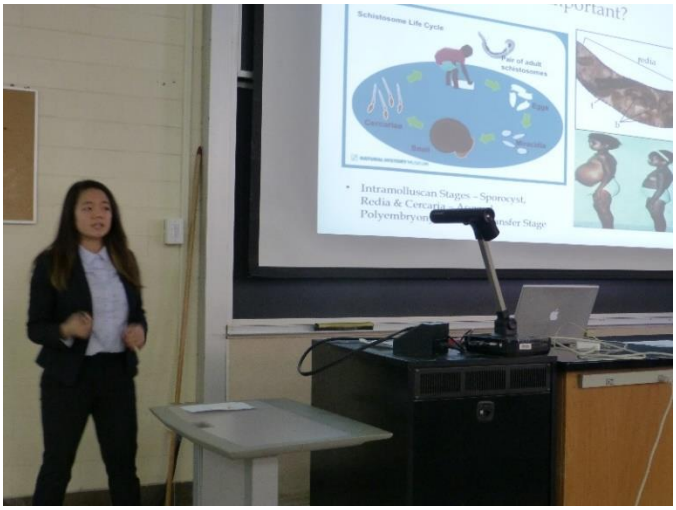
Abstract

Little information is available regarding the biology of the cercarial stage of the digenetic trematode, *Leuceruthrus micropteri*. Mature cercariae were frozen and their DNA analyzed to confirm our identification of the North Elkhorn Creek worm as *L. micropteri*. The present study was designed to provide quantitative data regarding the diurnal and long-term pattern of emergence of this worm from its snail intermediate host, precise location of rediae containing cercariae within the snail and the mechanism of retraction of the distome body into its cercarial tail stem. Infection of snails with *L. micropteri* was low at North Elkhorn Creek, Kentucky, with prevalences of 1.75% (7/400) and 0.93% (4/432) in 2004 and 2017, respectively. Most cercariae (96.1%) were released during the 12 h light cycle, and the average number of cercariae released/7 snails/day over 21 days ranged between 0-2.29. Individual snails most frequently shed between 0-2 cercariae per day. Histological analysis revealed rediae containing cercariae in the bottom whorl of the snail within the perintestinal sinus separated from the mantle cavity and gills by a thin mantle membrane. Retraction of the distome body into the tail stem in vitro was a rapid process requiring only a few minutes. The tail chamber evaginated with its lip moving forward over the body until the distome was completely enclosed.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Oral Presentation-Zoology Section: 1st place Undergraduate Research Competition)

Funded by Berea College URCPP & Mabel D. Worth Chair in Science (R. Rosen)



Pinniped Husbandry, Training, and Conservation at the Indianapolis Zoo. Emma Reasoner[1] and Mandy Goins[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Indianapolis Zoo, Indianapolis, Indiana, 46222.

Abstract

The Indianapolis Zoo currently maintains permanent collections of two Pinniped species, Pacific Walrus (*Odobenus rosmarus*) and California sea lion (*Zalophus californianus*). Both species are currently facing critical human attributable threats in their wild environments. The IUCN conservation status of the Pacific walrus is uncertain due to the difficulty of attaining an accurate census for the species. However, the species' dependence on presently receding ice floes suggests the likelihood of a significant downward population trend. California sea lions are also currently being affected by global climate change in the form of Domoic acid poisoning, which is connected to increased algal blooms. This neurotoxin is strongly linked to the high incidence of UMEs (Unusual Mortality Events) among California sea lions. Nearly all the pinnipeds at the Indianapolis zoo were placed there due to stranding and rehabilitation scenarios related to these human-induced environmental factors. At the zoo, they are involved in educational programs about their species and these threats. As a part of their husbandry, training is incorporated and has many functions, including making conservation research possible. Nearly all of the pinnipeds at the zoo are currently involved in research projects, and there are a number of additional projects in the early stages of development. The connection between the wellbeing of the species in the wild and the care of individual animals in zoos continues to be strengthened by education, research, and evolving animal care.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Funded by Indianapolis Zoo

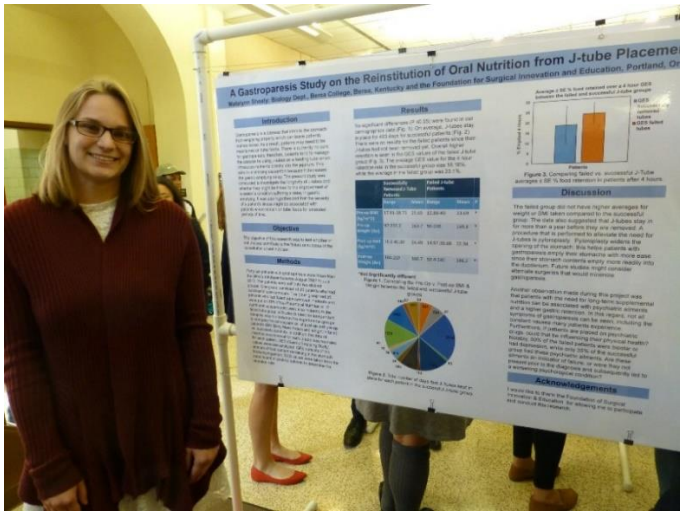
A Gastroparesis Study on the Reinstitution of Oral Nutrition from J-tube Placements. Matalynn Shealy[1] and Christy Dunst[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Foundation for Surgical Innovation and Education in Portland, Oregon, 97213.

Abstract

Gastroparesis is a disorder that delays gastric emptying causing many patients to suffer chronic nausea. There is no underlying cure for gastroparesis, but surgical intervention can be conducted to reduce discomfort. One approach entails inserting jejunal tubes (J-tubes). J-tubes are used as a feeding tube that introduces nutrients directly into the jejunum. This aids in minimizing discomfort because it decreases the gastric emptying delay. The present study was conducted to investigate the longevity of J-tubes and whether they might be linked to improvement of a patient's condition suffering a delay in gastric emptying. J-tubes were found to stay in for more than a year before they were removed. Patients with successful J-tube removal were compared with the patients who still had J-tubes in place. No significant difference ($P \leq 0.05$) was found between the two research groups regarding demographics. However, patients who required long-term supplemental nutrition were sometimes found to experience psychiatric ailments. Future investigations should assess if surgeries influence the time frame for J-tube removal.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Berea College Office of Internships and Career Development



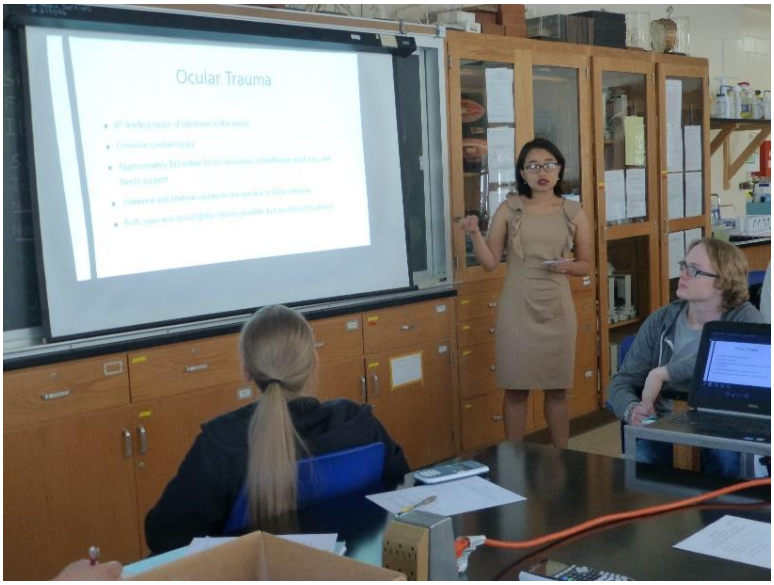
Antioxidant Treatment for Closed Globe Ocular Blast Trauma. Sunaina Sherchan[1] and Tonia Rex[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt Eye Institute, Nashville, Tennessee, 37232.

Abstract

Military personnel can experience both unilateral and bilateral traumatic eye injuries, mainly due to blast exposure caused by improvised explosive devices. Although military ocular trauma can be both closed globe and open globe injuries, there is significantly more damage involved with open globe injuries, and a distinct lack of treatment for both. Apart from enucleation, i.e. eye removal, direct traumatic optic neuropathy remains the leading cause of blindness occurring from ocular trauma in military service members. This study sought to find a treatment that would limit neurotrauma and vision loss caused by blasts. By providing high levels of powerful antioxidants vitamin C and vitamin E in diets of subjects, the study observed if the blocking effects of these antioxidants reduced oxidative stress and neuronal deficits. The results should reflect in the mitigation of the activation of the neuroinflammatory pathway in the retina. Methods: Wild type subjects were separated into sham and blast groups with supplemented levels of vitamins C and E for 1 month for the blast group. Both groups were exposed to either two sham or 15 psi blasts, with tissue collected 1 month post blast. Results: The high vitamin CE diet results showed a significant decrease in levels of pro-inflammatory cytokines and a decrease in axonal degeneration and gliosis. Future directions involve experiments with vitamin C knockout subjects to compare data with high vitamin CE diet subjects.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Funded by Department of Defense, Vanderbilt University and Berea College Office of Internships and Career Development



Hybrid ECMO Using Double Lumen Cannula Ensures Adequate Heart/Brain Oxygen Supply.

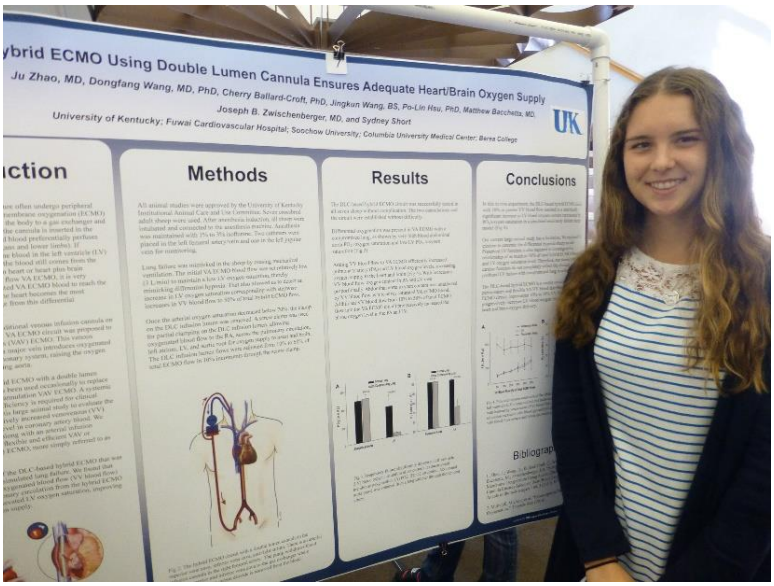
Sydney Short[1], Ju Zhao[2], Dongfand Wang[2], Cherry Ballard-Croft[2], Jingjun Wang[2], Po-Lin Hsu[2], Matthew Bacchetta[2] and Joseph B. Zwischenberger[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]University of Kentucky, Lexington, Kentucky, 40506.

Abstract

Individuals with respiratory failure often undergo peripheral venoarterial (VA) extracorpeal membrane oxygenation (ECMO) where blood is diverted outside the body to a gas exchanger and then back into the body. When the cannula is inserted in the femoral vein/artery, oxygenated blood preferentially perfuses the lower body (abdominal organs and lower limbs). If respiratory failure is present, the blood in the left ventricle (LV) is poorly oxygenated because the blood still comes from the native lung supply, resulting in heart or heart plus brain hypoxia. Venoarteriovenous (VAV) ECMO is used to mitigate the issue by supplying oxygenated blood to the pulmonary circuit through the right atrium as well as the femoral artery. Two-site cannulation hybrid ECMO with a double lumen cannula (DLC) has been used occasionally to replace the traditional three-site cannulation VAV ECMO. A systemic study of hybrid ECMO efficiency is required for clinical reference. We designed this large animal study to evaluate the effectiveness of progressively increased venovenous (VV) blood flows on oxygen level in coronary artery blood. We proposed to use a DLC along with an arterial infusion cannulation to establish flexible and efficient VAV or venovenoarterial (VVA) ECMO, more simply referred to as hybrid ECMO. We report the results of the DLC-based hybrid ECMO that was tested in 7 sheep with simulated lung failure. We found that only 10% additional oxygenated blood flow (VV blood flow) delivered to the pulmonary circulation from the hybrid ECMO circuit significantly elevated LV oxygen saturation, improving heart and brain oxygen supply.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Berea College Office of Internships and Career Development



Immunoglobulin Y Levels in Spectacled and Steller's Eider Sea Ducks as Indicators of Disease and Population Decline. Claire Thelen[1] and Katrina Counihan[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Alaska Sealife Center, Seward, Alaska, 99664.

Abstract Not Permitted By Sponsoring Agency

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Funded by Berea College Office of Internships and Career Development

Using the POGIL Approach in Non-Stem Disciplines. Miguel Valdes and Megan Hoffman. Biology Department, Berea College, Berea, Kentucky, 40404.

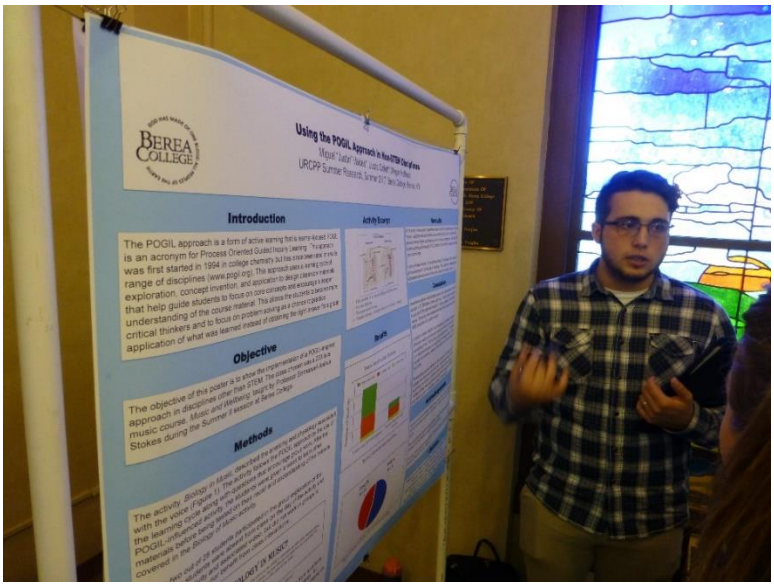
Abstract

The POGIL approach, or Process Oriented Guided Inquiry Learning, is a form of active learning that is learner-focused. This approach allows the student to become a more critical thinker and focus on problem-solving as a chance to practice application of what was learned instead of merely obtaining the right answer for a grade. The POGIL approach, which has been used in a variety of STEM disciplines, was implemented in music, with great success. An activity entitled "Biology in Music" was developed to engage students in the anatomy and physiology associated with the voice. The activity follows the POGIL approach by the use of the learning cycle and questions designed to engage students in focused team work and exploration. Exam-based assessments indicated that the students retained the information from the activity and were able to apply it in new situations.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Science Education Section: 1st place Undergraduate Research Competition)

Funded by Berea College URCPP



Improving Long Term Outcomes in Retinoblastoma Survivors. Marah Zeidan[1] and Debra Friedman[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

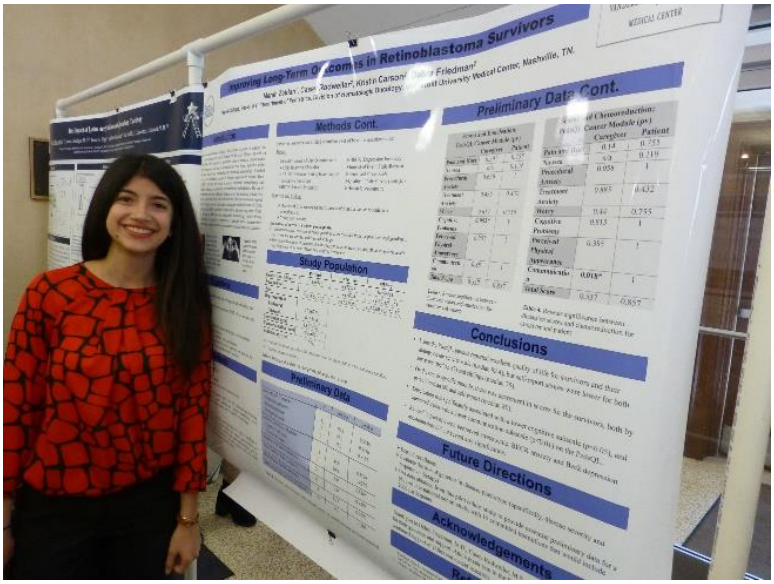
Abstract

Retinoblastoma is the paradigm for a genetically inherited cancer, a rare intraocular malignancy that begins in the developing retina. It results from loss or mutation of both copies of RB1, a tumor suppressor gene. Cure rates for retinoblastoma, treated with enucleation and/or external bean radiotherapy (EBRT), approach 100%, but are accompanied by adverse long-term sequelae including visual defects, cataracts, second malignant neoplasms (SMN) and impaired psychosocial and neurocognitive function. However, minimal data exists regarding the long-term sequelae of contemporary therapies. We hypothesize that contemporary therapy without enucleation or EBRT will be associated with less long-term morbidity. In this ongoing pilot cohort study, we aim to enroll 30 patients with their adult caregiver and sibling to obtain preliminary data to inform a large multinational study to define long-term outcomes for survivors treated with contemporary therapy. Enrolled patients consist of survivors of retinoblastoma diagnosed at age 0-4 and treated at Vanderbilt from 2002 to current and according to inclusion criteria. All participants are asked to complete a set of baseline questionnaires. Furthermore, medical record abstractions are completed for each enrolled survivor to document late effects of treatment. To date, 20 patients have been enrolled with preliminary analyses run in April of 2017 on 18 enrolled patients, caregivers and siblings. Our long-term goal of this proposed research is to understand the long-term outcomes of retinoblastoma survivors treated since the mid-1990s and determine whether we have truly been successful in improving and addressing which therapy is the optimal choice for most children.

Vanderbilt Summer Science Academy 15th Annual Student Research Symposium, August 3, 2017, Vanderbilt Medical Center, Nashville, Tennessee (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Undergraduate Clinical Research Internship Program (UCRIP), Vanderbilt University and Berea College Office of internships and Career Development



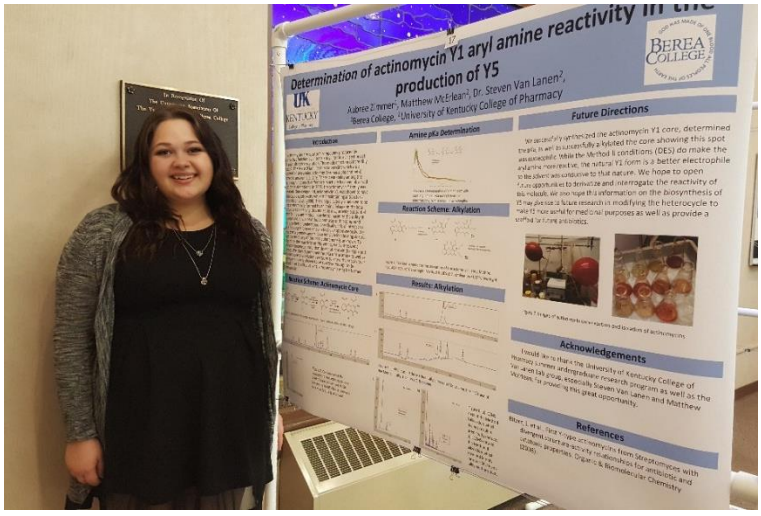
Determination of Actinomycin Y1 Aryl Amine Reactivity in the Production of Y5. Aubree Zimmer[1] and Steven Van Lanen[2]. [1]Biology Department, Berea College, Berea, Kentucky, 40404. [2]University of Kentucky College of Pharmacy, Lexington, Kentucky, 40506.

Abstract

Bacteria are rapidly increasing their resistance to current medicines leading researchers to look for novel compounds to combat infectious diseases. In the past, actinomycins have been shown to be effective against bacteria but were also shown to be cytotoxic. However, a recently discovered family member, actinomycin Y5, was found to have antibacterial properties without being cytotoxic. We believe that the reason for this change in activity is due to Y5's unique beta-ring heterocycle. However, we have been unable to isolate this compound from a crude extract of Streptomyces GÖ-GS12, though we believe the formation of this compound can be induced chemically. To test our ability to do so, we synthesized a simplified actinomycin core to determine the reactivity of the core's aryl amine by alkylating the amine and determining the pKa. We believe this amine is important for this antibacterial/low cytotoxicity activity as well as instrumental for the formation of the beta-ring heterocycle. This information allows us to determine the mechanism behind the Y5 biosynthesis as well as provide a basis for future research to modify Y5 to produce future antibiotics.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by University of Kentucky College of Pharmacy and NSF



Selective C–O Bond Reductions in Carbohydrate Derivatives Using Boron Based Reagents. Luis Gonzalez Anguiar[1] and Michel Gagné[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]University of North Carolina at Chapel Hill, North Carolina, 27599.

Abstract

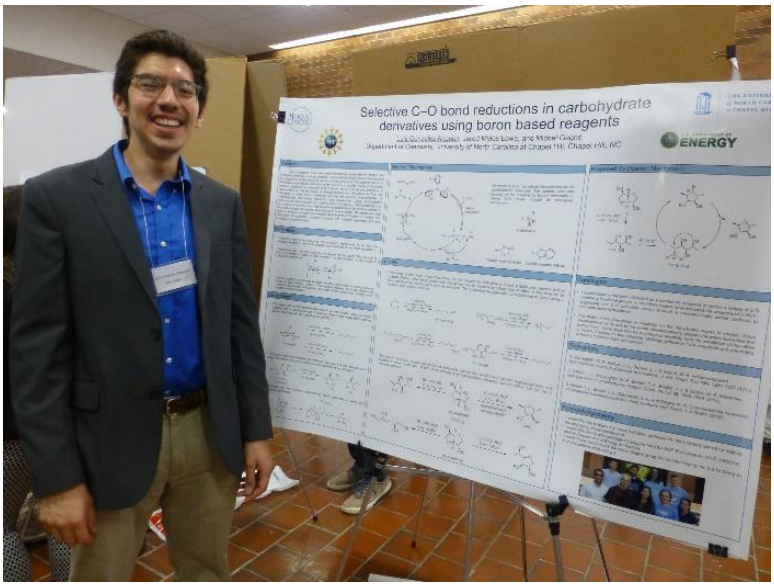
Boron reagents have been used increasingly, particularly in organic and synthetic chemistry, in recent decades. Tris(pentafluorophenyl)borane has become an important catalyst due to its role as a strong Lewis acid. This catalyst has led to alternative mechanistic pathways in the reduction of a wide variety of functional groups, including the reduction of C-O bonds. As C-O bonds are ubiquitous in nature this has led the desire to develop biofuels and fine chemicals from the cleavage of these bonds. Herein we describe the reduction and cyclization of carbohydrate derivatives, isosorbide and isomannide, using stoichiometric amounts of catecholborane and catalytic amounts of B(C6F5)3. Mechanistically, it is hypothesized that the furan rings are reduced selectively at the primary position in the carbohydrate derivatives, generating a 1,6-deoxytetraol. The tetraol can then form a new furan through an intramolecular attack from the C2 to the C5 position. This reduction of isosorbide produces a product with inversion symmetry and four contiguous stereocenters.

Summer Undergraduate Pipeline, July 26, 2017, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Chemistry: Organic/Inorganic Section)

Funded by Berea College Office of Internships and Career Development



N-Heterocyclic Carbene Complexes. Mario Chavarria, Cheyenne Haynes and Anes Kovacevic. Chemistry Department, Berea College, Berea, Kentucky, 40404.

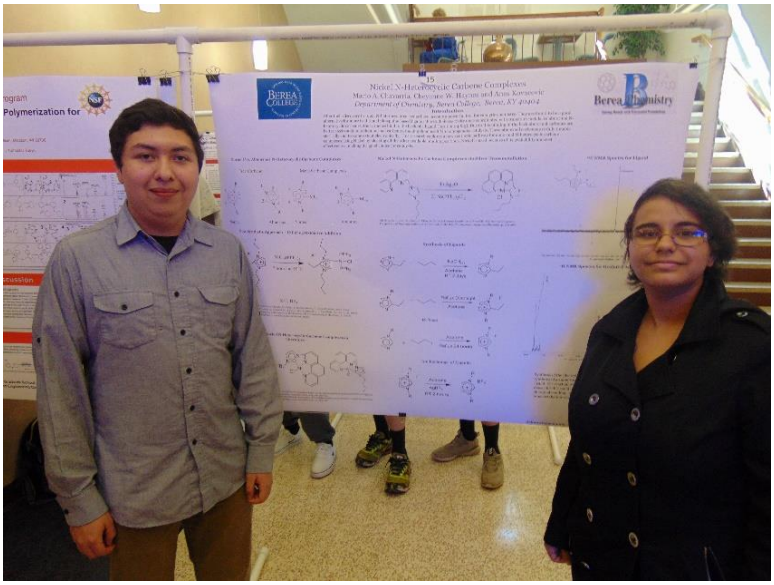
Abstract

N-heterocyclic carbenes have become increasingly popular ligands for organometallic catalysis 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 explores a novel synthetic pathway to normal and abnormal carbene complexes. It involves imidazolium based ligands, transmetallation using silver and C-H bond activation with nickel and iridium.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Chemistry: Organic/Inorganic Section)

Funded by Berea College URCPP



Identification of Selective DDR1 Kinase Inhibitors Using Structure Activity Relationship. Issac Domenech[1], Ambra Pozzi[2] and Corina Borza[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

Abstract

Discoidin domain receptor 1 (DDR1) is a receptor tyrosine kinase that binds to and is activated by collagens. Although activation of DDR1 is required for normal tissue development, DDR1 upregulation and/or activation following injury is detrimental in conditions such as cancer, atherosclerosis, and fibrotic diseases. The focus of our research is to determine the role of DDR1 in kidney fibrosis. We showed that loss of DDR1 reduces fibrosis and improves renal function in models of kidney disease. In addition, cells expressing kinase dead DDR1 produce significantly less collagen than cells expressing wild type DDR1. This result indicates that the kinase activity is required for DDR1-mediated pro-fibrotic effect. Based on this finding, our goal is to develop a small molecule ATP-competitive inhibitor that can selectively inhibit the kinase activity of DDR1. Using structure-activity relationship optimization and time-resolved fluorescence energy transfer assays, we synthesized and screened 95 derivatives of a previously characterized inhibitor, Compound 1 (IC50 for DRR1 = 11.9nM), in order to generate inhibitors with better selectivity and lower IC50. Because of the high homology between DDR1 and DDR2, we tested potential inhibitors for selective inhibition of DDR1 versus DDR2. Our results revealed 14 promising inhibitors, three of which showed a lower IC50 than Compound 1. However, all 14 small molecules inhibited both DDR1 and DDR2. We are in the process of refining the structures of the 14 compounds to improve selectivity and specificity. Our ultimate goal is to use these inhibitors in the setting of fibrotic diseases. Research was supported by a Veteran's Affairs Merit Awards 1I01BX002025. This work was also supported by the Aspirnaut Program through the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health, R25 DK09699 to B.G.H, Vanderbilt University Medical Center and the Center for Matrix Biology.

KUH Summer Undergraduate Research Conference, August 2-4, 2017, Bethesda, Maryland (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Cellular and Molecular Biology Section

Funded by Berea College Office of Internships and Career Development, Hal Moses/Aspirnaut Research Internship, Vanderbilt University

Targeting Proteolytic Activity Using Protease Inhibitors as Natural Therapeutics for Human Metapneumovirus (HMPV). Amber Earlywine[1], Tyler Kinder[2] and Rebecca Dutch[2]. [1] Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]Department of Cellular and Molecular Biochemistry, University of Kentucky College of Medicine, Lexington, Kentucky, 40506.

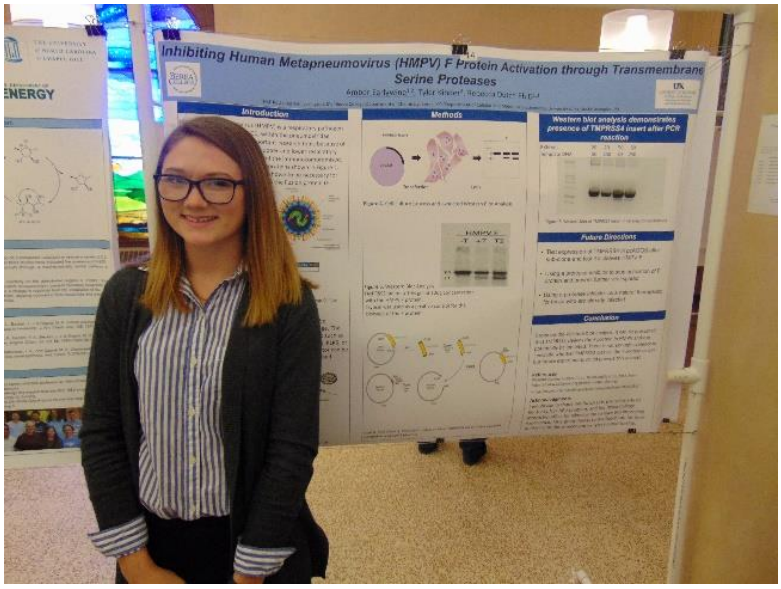
Abstract

The fusion protein (F protein) has shown to be the only surface protein necessary for viral transmission of the negative sense, ssRNA virus, Human Metapneumovirus (HMPV). The F protein is activated through cleavage by proteolytic activity. The cleavage event causes a conformational change in the F protein where Heptad Repeat A (HRA) moves from the globular head, attaches to the membrane of the target cell, and moves to the stalk domain, fusing the two membranes. Based on previous knowledge of how serine proteases cleave Hemagglutinin (HA) in Respiratory Syncytial Virus (RSV), it is believed that these proteases also cleave the Fusion protein in HMPV. The goal of this project was to test if different proteases such as HAT (TMPRSS11D), TMPRSS2, TMPRSS4, Matriptase, KLK5, or KLK12 cleave the F protein so that we can use a protease inhibitor and stop viral spread. However, there was a focus on TMPRSS2 and TMPRSS4. First, expression of TMPRSS4 was tested using Western Blot Analysis, using HA as a positive control. When no expression was seen, TMPRSS4 was sub-cloned into pcAGGS from pcDNA and cleavage was not seen. TMPRSS2 expression was also tested through Western Blot Analysis with trypsin as a positive control and cleavage of the F protein was observed, suggesting that the TMPRSS2 protease can be inhibited.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Microbiology Section)

Funded by University of Kentucky



Measurement of Chemical Shift Tensors and J-Coupling in Sodium/Lead Mixed Pyrophosphate Glasses. Sara Garner, Tomas Flores, Shay Steele and Jay Baltisberger. Chemistry Department, Berea College, Berea, Kentucky, 40404.

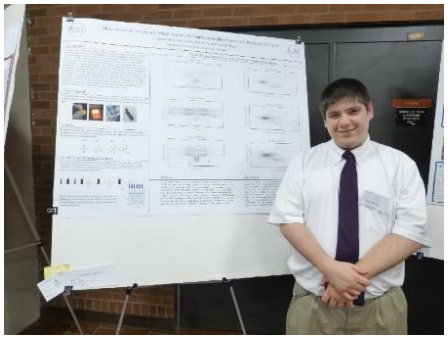
Abstract

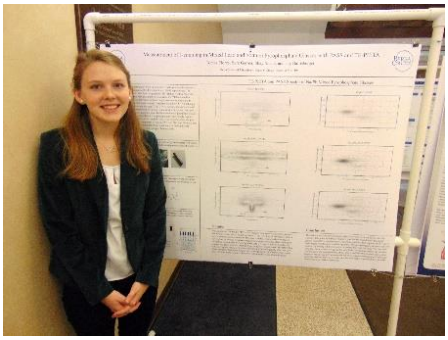
In pyrophosphate, the J-coupling distribution is strongly correlated with P–O–P bond-angle distribution. By using solid state Nuclear Magnetic Resonance (NMR) J-coupling patterns can be viewed and help determine structural information. The hypothesis that was proposed was that the mixed glasses would have two regions of J-coupling patterns. Rich regions of Pb2+ and another region with both Na+ and Pb2+ patterns. The pyrophosphate samples were synthesized by mixing solid compounds of varying Pb2+ and Na+ ions. The mixed solids was then placed in a muffle furnace and heated to 1100°C. The molten glass was poured onto a copper plate and quenched. The samples were ground to a fine powder and packed into rotors. The samples were analyzed using solid state NMR experiments. PASS (Phase Adjusted Spinning Sidebands) and TE-PIETA (Total-Echo Phase Incremented Echo Train Acquisition). The raw data was then placed into a specialized program to view J-coupling of the PASS and PIETA. Many of the mixed samples displayed as two types of J-coupling. When compared to a pure lead sample the J-coupling was close to 23 Hz; however, the mixed samples seemed to lower the J-coupling to about 14 Hz. We also looked at the chemical shift anisotropy (CSA) of the samples and appears that there is not much variability within them.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Chemistry: Analytical/Physical Section: 3rd place Undergraduate Research Competition)

Funded by Berea College URCPP





Synthesis of Cleavable Acetal Antibody Drug Conjugate. Isaac Mendoza, Luis Guzman Salazar and Elizabeth Thomas. Chemistry Department, Berea College, Berea, Kentucky, 40404.

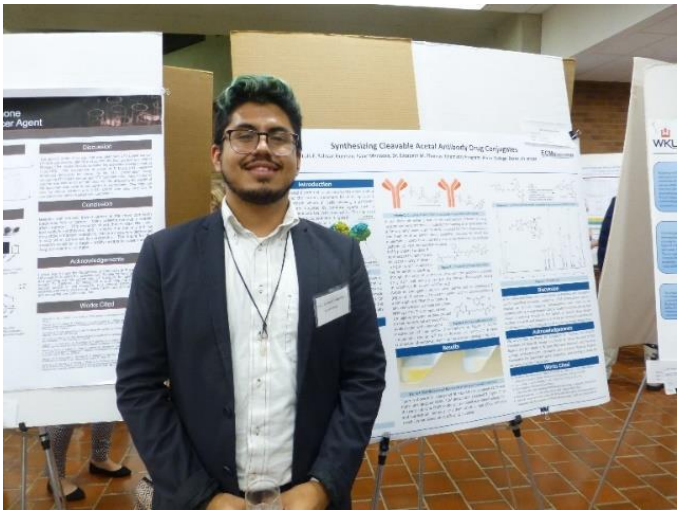
Abstract

The design of a hydrophilic heterobifunctional linker with the functionality to conjugate to a monoclonal antibody, mAb, was our research goal. When drug toxins are bound to the linker that is conjugated to a mAb, these molecules are known as antibody-drug conjugates, ADC's. Linking drug toxins to mAbs is a way to deliver drug molecules specifically to cancer cells without targeting the healthy cells within the body. This minimizes the toxic effects of chemotherapy treatments. A heterobifunctional linker is functionalized on two separate ends of the small organic molecule. One end of the linker facilitates covalent bonding to the mAb while the other end facilitates covalent bonding to a toxin drug molecule. The mAbs that we are interested in bind specifically to the extracellular matrix (outside cell surface) of cancer cells; in particular antibody CD-55. Our desired linker consisted of a uridine molecule covalently bonded to maleimide through an acetal moiety. The importance of the acetal is that this functional group is cleavable at a pH of 5.5 and therefore, once endocytosed (brought inside the cell membrane) within the cancer cell, should cleave to release the drug toxin. Outside the cell membrane is a pH of 7.2. Acetal functions are stable at pH of 7.2 and therefore would remain intact outside the cancer cell. The simulated cancer drug is uridine, however, 5-fluorouridine is a known cytotoxin that can be attached to the heterobifunctional linker in place of uridine once the chemistry has been established. We successfully synthesized the final intermediate precursor to the desired product containing the uridine group. Ideally, once the final product is synthesized, further research would be conducted to demonstrate the cleavage efficiency of the desired compound and then the synthesis of the 5-fluorouridine ADC for evaluation as a cytotoxin specific towards cancer cells that express CD-55.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Chemistry: Organic/Inorganic Section)

Funded by Berea College URCPP



Integrin β-1 Promotes KRAS-Mutated Lung Cancer Viability via FAK Activation. Kateryna Nabukhotna[1], Scott Zent[2] and Roy Zent[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

Abstract

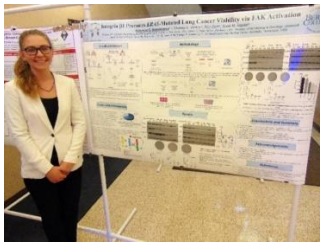
Normal epithelial cells, but not cancer cells, need to attach to the basement membrane, a thin layer of extracellular matrix (ECM), to proliferate. This phenomenon, known as anchorage independence, is a key property that enables cancer invasion and metastasis. Integrins are the primary receptors that mediate cell attachment to the ECM. They are transmembrane receptors that function as heterodimers consisting of α- and β-subunits. Eighteen α-subunits and eight β-subunits pair forming twenty-four integrins. In addition to adhesion, these receptors regulate cell motility, proliferation and signal transduction. Integrin β-1 (ITGB1) is a key integrin that binds cells to multiple ECM components such as collagens, laminins and RGD proteins. To test the hypothesis that integrin function is critical for achieving anchorage independence in cancer cells, human KRAS-mutated lung adenocarcinoma cell lines were generated with CRISPR-mediated knock-out (KO) of ITGB1. ITGB1-KO cells demonstrated decreased anchorage–independent survival in multiple assays. Western blotting showed decreased activation of important cell signaling regulators including focal adhesion kinase (FAK) and extracellular signal-regulated kinase (ERK) in ITGB1-KO cells. Inhibition of FAK with a targeted inhibitor decreased FAK and ERK activation as well as cell viability in wild type cells. Furthermore, treatment with FAK inhibitor abrogated the ability of cancer cells to develop colonies in soft agar, an assay of both anchorage independence and tumorigenesis. This data led to the conclusion that ITGB1 activates FAK and drives cancer cell growth even in the absence of ECM. Targeting this signaling pathway is a promising therapeutic strategy in KRAS-mutated lung cancer. This research was supported by: -The Aspirnaut™ Program through the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health, R25 DK09699 to B.G.H. -Berea College Office of Internships -Vanderbilt University Medical Center -Vanderbilt Center for Matrix Biology.

KUH Summer Undergraduate Research Conference, August 2-4, 2017, Bethesda, Maryland (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

American Society of Nephrology Annual Meeting, November 2-4, 2017, New Orleans, Louisiana (Poster Presentation)

Funded by National Institute of Diabetes and Digestive and Kidney Diseases R25 DK09699, Hal Moses/Aspirnaut Research Internship, Vanderbilt University and Berea College Office of Internships and Career Development



GC-MS Analysis of Volatile Organic Compounds in Metastatic and Non-Metastatic Breast Cancer Cells. Clara Reasoner[1] and Mangilal Agarwal[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]Integrated Nanosystems Development Institute, Indiana University-Purdue University Indianapolis, Indiana, 46202.

Abstract

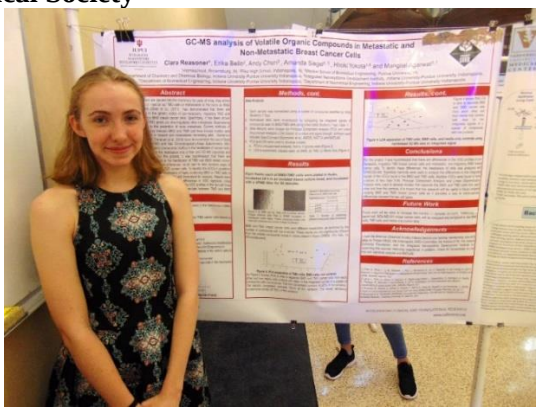
When MDA-MB-231 cells are injected into the mammary fat pads of mice, they either remain at the location of injection as TMD cells or metastasize to the bone as BMD cells. Recent research has demonstrated that there are identifiable differences in the genetic codes of pre-metastatic, migratory TMD and metastatic, non-migratory BMD breast cancer cells. Specifically, it has been shown that the S100A4 and GRM3 genes are downregulated after metastasis. Suppressing these genes may lead to the prevention of bone metastasis. Current methods of observing these differences between BMD and TMD cell lines include nucleic acid sequence analysis, which is invasive and necessitates harvesting cells. Numerous studies have demonstrated the use of Solid Phase Microextraction (SPME) and Gas Chromatography-Mass Spectrometry (GC-MS) to analyze Volatile Organic Compounds (VOCs) in the headspace of cancer cells. SPME concentrates VOCs in the headspace onto a fiber and GC-MS separates and identifies the compounds. For this project, it was hypothesized that there are differences in the VOCs present in the headspace of TMD and BMD breast cancer cells. The determination of these differences could lead to less invasive ways of differentiating between BMD and TMD cancer cells. To identify the VOCs in question, a SPME fiber was placed in the headspace of flasks containing BMD or TMD cells to adsorb the VOCs and injected into the GC-MS instrument for analysis. Results were compared statistically to identify measurable differences in VOC signature. Initial results demonstrate that there are differences in the VOC profiles of the two cell lines and SPME/GC-MS is able to noninvasively differentiate between TMD and BMD breast cancer cells.

Indiana High School Scientific Research Symposium, July 20, 2017, Indiana University-Purdue University Indianapolis (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Chemistry: Analytical and Physical Section)

Funded by American Chemical Society



Characterization of Host-Pathogen Interactions During Early Stage Chikungunya Virus Infection.

Seth Reasoner[1] and Manuel Ascano, Jr[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

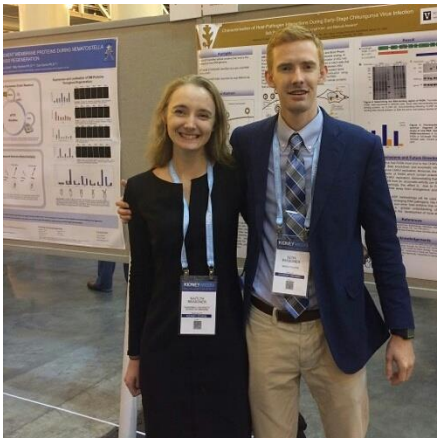
Abstract

Chikungunya virus (CHIKV) is a zoonotic arbovirus with a positive-sense single-stranded RNA genome. Transmitted by mosquitos, CHIKV has recently emerged globally with over one million cases annually worldwide. To discover direct host-pathogen interactions and mechanisms, we developed a novel photochemical crosslinking approach, termed VIR-CLASP (Viral Induced Ribonucleoside-Crosslinking and Solid-Phase Purification). We report the identification of hundreds of cellular proteins that bind to first-generation, pre-replication RNA viral genomes of CHIKV. Importantly, we identified FATTY ACID SYNTHASE (FASN) as a host protein that directly interacts with the ssRNA genome of CHIKV. While FASN has been reported to be important for the replication or viral assembly of other alphaviruses, the corresponding mechanism is poorly characterized. We provide evidence that FASN must bind to CHIKV for its pro-viral function. Knockdown and enzymatic inhibition of FASN independently reduce CHIKV replication. Moreover, overexpression of truncated segments of FASN, which contain potential RNA-binding sites, abrogates CHIKV replication, demonstrating that decoupling the RNA binding of FASN from its enzymatic activity can likewise have an anti-viral effect. Seemingly this effect is due to FASN fragments sequestering viral RNA away from endogenous and active FASN. Our work underscores the utility of VIR-CLASP as a generalizable approach for characterizing a poorly understood spatiotemporal niche between host RNA-binding proteins and the numerous existing and emerging RNA viral pathogens. We hope that further investigation of FASN and other host proteins that interact with viral genomes will lead to a greater understanding of host-pathogen interactions and advance the development of more effective anti-viral therapies.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

American Society of Nephrology Annual Meeting, November 2-4, 2017, New Orleans, Louisiana (Poster Presentation)

Funded by National Institute of Diabetes and Digestive and Kidney Disease R25 DK09699, Hal Moses/Aspirnaut Research Internship and Vanderbilt University



Investigating a Role For Loxl2 in Tgf-β1 Mediated Tubular Epithelial Mesenchymal Transition in Kidney Fibrosis. Marco Santos[1], Halima Ibrahim[2], Rafi Mohamed[2], Alberto J. Lopez-Jimenez[2] and Roberto Vanacore[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

Abstract

Tubulointerstitial fibrosis is a defining characteristic of chronic kidney disease. Contributing to this condition is a process known as Epithelial-Mesenchymal Transition (EMT). In tubulointerstitial fibrosis, the cells only go through a partial EMT mechanism, where they do not fully convert to the mesenchymal phenotype but lose some of their main structural components such as E-cadherin. Lysyl oxidase like 2 (LOXL2), an enzyme involved in the biosynthesis of extracellular matrix, has recently been associated with this process. It has been proposed that LOXL2 has an intracellular role stabilizing the components needed for EMT, unrelated to the lysyl oxidase activity. Moreover, data gathered from different kidney-derived cell lines has suggested an up-regulation of LOXL2 driven by TGF-β1, a known mediator of fibrosis. Therefore, the goal of this project was to study the expression and activity of LOXL2 in the EMT mechanism using proximal tubular epithelial (HK-2) cells as our model. By stimulating with TGF-β1, we were able to successfully induced EMT in vitro. From the extracellular and intracellular proteins of HK-2 cells, western blot analyses was used to check the level of expression of LOXL2 and epithelial markers such as E-cadherin. Our results showed a repression of E-cadherin, but no significant changes in intracellular levels of LOXL2 perhaps due to HK-2 cells already expressing high levels of LOXL2. Ongoing efforts are being placed on generating a LOXL2 knockout HK-2 cell line using the CRISPR-Cas9 system to fully characterize the role of LOXL2 in the tubulointerstitial EMT.

KUH Summer Undergraduate Research Conference, August 2-4, 2017, Bethesda, Maryland (Poster Presentation)

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

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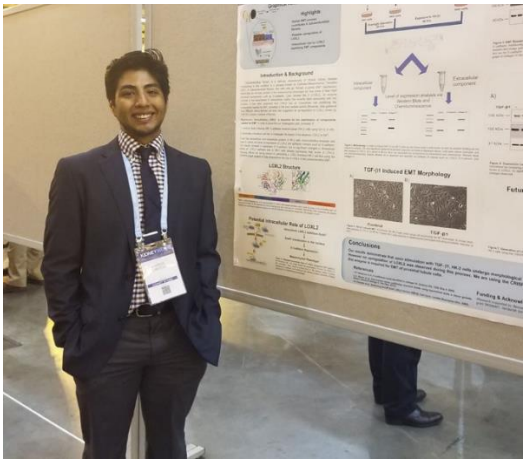
Funded by National Institute of Diabetes and Digestive and Kidney Diseases R25 DK09699, Hal Moses/Aspirnaut Research Internship and Vanderbilt University



Synthesis of Poly(4-hydroxystyrene) by Living Anionic Polymerization for Block Copolymer Lithography. Beau Schweitzer[1], Koei Azuma[2] and Padma Gopalan[2]. [1]Chemistry Department, Berea College, Berea, Kentucky, 40404. [2]University of Wisconsin-Madison, Madison, Wisconsin, 53706.

Abstract

Block Copolymers composed of chemical constituents that are incompatible can microphase separate. Similar to the way oil and water are immiscible so they phase separate. Since the blocks are covalently bonded to each other they cannot dissociate in a macroscopic way like oil and water instead they form nano-structures which are governed by the size of each block. Polymer scientists use thermodynamics to describe how the different blocks interact. The product of the degree of polymerization, n, and the Flory-Huggins interaction parameter, chi, gives an indication of how incompatible the two blocks are and whether or not they will microphase separate. For example, a diblock copolymer of symmetric composition will microphase separate if the product chi * N is greater than 10.5. If chi * N is less than 10.5, the blocks will mix and microphase separation is not observed. The incompatibility between the blocks also affects the solution behavior of these copolymers and their adsorption behavior on various surfaces. The structures formed are called morphologies and the most common are lamella cylinder gyroid and body centered cubic. L0 is the distance which when minimized created the most fine nanostructure, Sub 10 nanometer L0 are optimal. Block copolymer self-assembly is generally limited to forming simple patterns such as arrays of dots or lines, determined by the volume fraction of the blocks and the processing conditions. It is desirable to be able to modify both the period of the patterns and their morphology to form more complex structures useful in devices. The period of well-ordered thin films of poly (styreneblock-dimethylsiloxane) (PS-b-PDMS) or poly (styrene-blockmethyl methacrylate) (PS-b-PMMA) can be varied by up to ~10% by use of an incommensurate template to strain the microdomain array or by changing the annealing conditions. Patterns such as isolated lines have been achieved by changing the orientation of lamellar or cylindrical microdomains from out-of-plane to in-plane in specific areas of the substrate using chemical patterns or UV irradiation-induced orientation changes, and aperiodic patterns such as jogs and zigzags can be templated by chemical patterns or sparse topographic templates. In these examples the block copolymer film retains its morphology (i.e., cylinders or lamellae) but the microdomain orientation is locally varied from in-plane to out-of-plane. Varying the morphology within a given block copolymer film, from spheres to cylinders, for example, can facilitate production of more complex patterns but requires a process in which different processing conditions are applied to different regions of the film.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Chemistry: Organic/Inorganic Section)

Funded by University of Wisconsin-Madison

Synthesizing Cleavable Acetal Antibody Drug Conjugates. Sarah Tabor, Michael James and Elizabeth Thomas**.** Chemistry Department, Berea College, Berea, Kentucky, 40404.

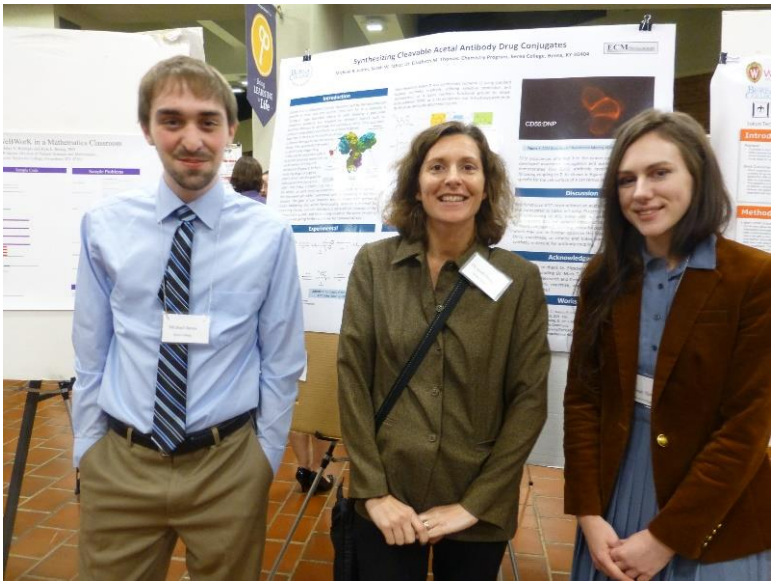
Abstract

There is a need for cancer treatment to be exclusively targeted towards cancerous tissue and thus innocuous towards regular tissue; antibody drug conjugates (ADCs) are a method that utilize a monoclonal antibody (mAb) for targeting cancerous tissues, a drug for its cytotoxic effects, and a small molecule linker to connect the two and specifically release the cytotoxic payload at its intended target. While the theoretical benefits behind them are strong, ADCs lack diverse cleavage methods to deliver their carried drugs. One mechanistic approach for drug delivery would be cleavage of an ADC based on the acidic environment found in cancerous cells (pH = 5.5 in cancerous cells, compared to 7.2 in the systemic circulation). Therefore, the acetal functionality was explored as a novel cleavage mechanism because of its hydrolytic propensity in acidic environments. Two small organic molecule linkers were designed and partially synthesized with the purpose of conjugating chromophores (2,4-dinitrophenyl) to cancer specific mAb to explore the acetal moiety in cellular cancer models, and a non-cleavable small molecule linker was synthesized to develop biological assays for characterizing the designed ADCs. Future studies will evaluate the acetal chemistry for linking cytotoxins in the place of chromophores as cancer therapies.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Chemistry: Organic/Inorganic Section)

Funded by Berea College URCPP



Appalachian Nature Education Study. Emma Batson, Gracie Casciola and Neil Mecham. Child and Family Studies Department, Berea College, Berea, Kentucky, 40404.

Abstract

The Appalachian Nature Education Study used qualitative methodology to explore teachers' inclusion of nature in their classroom curriculum, and uncover barriers teachers may face that keep them from incorporating nature more often. Fifteen teachers from schools located in Eastern Kentucky and West Virginia were interviewed using a modified structured-conversation style interview protocol. Interviews were recorded then transcribed and read by two researchers. Utilizing a phenomenology framework for the data collection and analysis procedures, the following initial three themes developed. 1) Some teachers are identified by their peers as the "nature" people in their schools. This is an informal designation given those who are promoters and instigators of nature oriented initiatives at their schools. They are recognized and utilized as a resource by other teachers. Designated science teachers usually fit into this informal designation. 2) teachers see nature education as important, but diminishing due to; a) Time, which has been diverted to standardized testing, b) Reduced onsite resources, and c) lack of confidence and interest among faculty, and 3) networking is important to increasing resource, and confidence. Connected teachers find and utilize resources that others don't know about.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Funded by Berea College URCPP

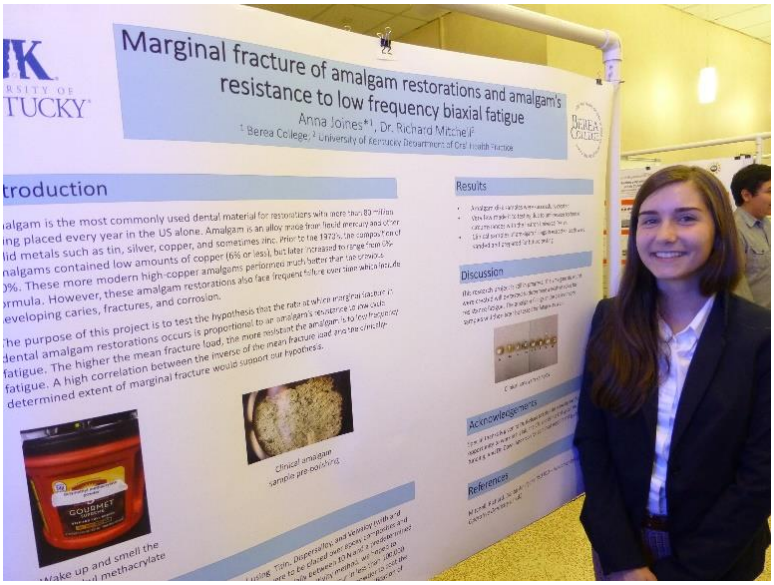
Marginal Fracture of Amalgam Restorations and Amalgam's Resistance to Low Frequency Biaxial Fatigue. Anna Joines[1] and Richard Mitchell[2]. [1]Communication Department, Berea College, Berea, Kentucky, 40404. [2]University of Kentucky, Lexington, Kentucky, 40506.

Abstract

Amalgam is the most commonly used dental material for restorations with more than 80 million being placed every year in the US alone. Amalgam is an alloy made from liquid mercury and other solid metals such as tin, silver, copper, and sometimes zinc. Prior to the 1970's, the composition of amalgams contained low amounts of copper (6% or less), but later increased to range from 6%-30%. These more modern high-copper amalgams performed much better than the previous formula. However, these amalgam restorations also face frequent failure over time which include developing caries, fractures, and corrosion. The purpose of this project is to test the hypothesis that the rate at which marginal fracture in dental amalgam restorations occurs is proportional to an amalgam's resistance to low cycle fatigue. The higher the mean fracture load, the more resistant the amalgam is to low frequency fatigue. A high correlation between the inverse of the mean fracture load and the clinically-determined extent of marginal fracture would support our hypothesis.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Center for Teaching and Learning, Berea College



Design and Implementation of a Web-Based Simulation. Dusty Cole, Vincent Davis, Michael Moorer and Martin Veillette. Computer Science Department, Berea College, Berea, Kentucky, 40404.

Abstract

For this project, our group worked on the development of a simulation aimed at elementary school children. The simulation teaches mixed and proper fraction, fraction representation and equivalence of fractions. Using JavaScript, we have designed a web-based simulation that runs on smartphones, tablets and touch enabled devices to represent fractions. Our open source simulation is part of the PhET project which seeks to engage students with simulations through an intuitive, game-like environment where students learn through exploration and discovery.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Berea College URCPP

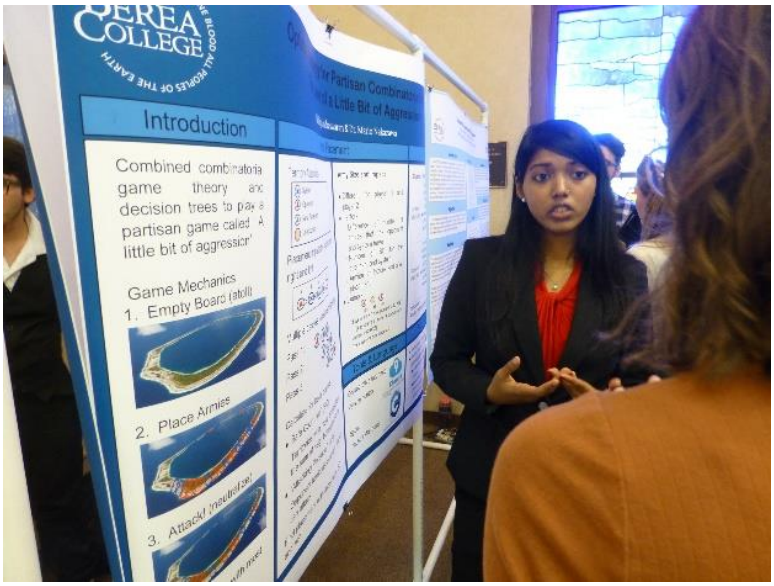
Machine Learning and Combinatorial Games. Lakshiya Indreswaran and Mario Nakazawa. Computer Science Department, Berea College, Berea, Kentucky, 40404.

Abstract

Combinatorial games have the property that as the size of the game increases, one must investigate an exponentially increasing number of strategies to determine the optimal one that guarantees a win. Exhaustive searching this space is thus computationally intractable for any games of moderate size. If one is seeking a "good enough" strategy, however, one can use machine learning to evolve such strategies from a random starting point to a winning final move. A critical component of this technique is a "fitness function" that measures the effectiveness of a given strategy that takes into consideration the layout of the game and the decisions that the players made when it is their turn. Note that here, a strategy is a complete sequences of moves of all the players from start to end. The research this summer focused on designing and implementing this function, but in the process, we determined that the complexities of the game are not conducive to machine learning. We instead used this function as a set of rules that guide a computer playing against a human opponent. This technique evaluates the current game configuration and the human player's most recent move to determine the computer's best next move. Thus, it does not find the optimal strategy but responds to episodic information to generate single moves that are designed to increase the chances that the computer will win. We have developed this proof of concept system that successfully creates the initial game configuration and can often win when playing against a human player. Future directions include increasing the function's sophistication, and enabling the computer to play against itself to test the validity of that function.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Berea College URCPP



Analyzing Trade Books and Other Print Media for Classroom Use. Sara Ullom, Cherokee Griffiths, Rebecca O'Connor and Maggie Robillard. Education Studies Department, Berea College, Berea, Kentucky, 40404.

Abstract

Berea students in the Education Studies Department are asked to creatively write lesson and unit plans for the academic content areas taught in community K-12 schools. To succeed, students rely in part on library materials to be of high quality, easily accessible, and related to educational topics and themes. Libraries are excellent sources for students, but are typically organized according to the Dewey Decimal System, which categorizes materials in a way that is much different from Kentucky Core Content Standards. Students in Education Studies therefore sometimes struggle to find appropriate materials which support the integration of literacy, fiction, and non-fiction into cohesive lesson and unit plans. We utilized survey data from stakeholders, related library organizational literature, and Kentucky Core Content Standards to create a more user-friendly categorization system to support our students. The system we created was inspired by "genre organization" which is used by many K-12 schools, although we modified the categories to address the unique needs of our undergraduate students, which differ from those of K-12 students. The resulting Content Exploration Centers group library materials by topic and theme in a way that makes sense when teaching content standards. Content Exploration Centers integrate fiction, non-fiction, and manipulatives which we believe will support students as they create original lesson and unit plans. We predict increased use of library materials based on our work, although comparative check-out data and patron feedback will need to be collected and analyzed before conclusions may be drawn. This research, if found to be successful, may be utilized by other undergraduate education programs to support students in their goal to become future educators.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

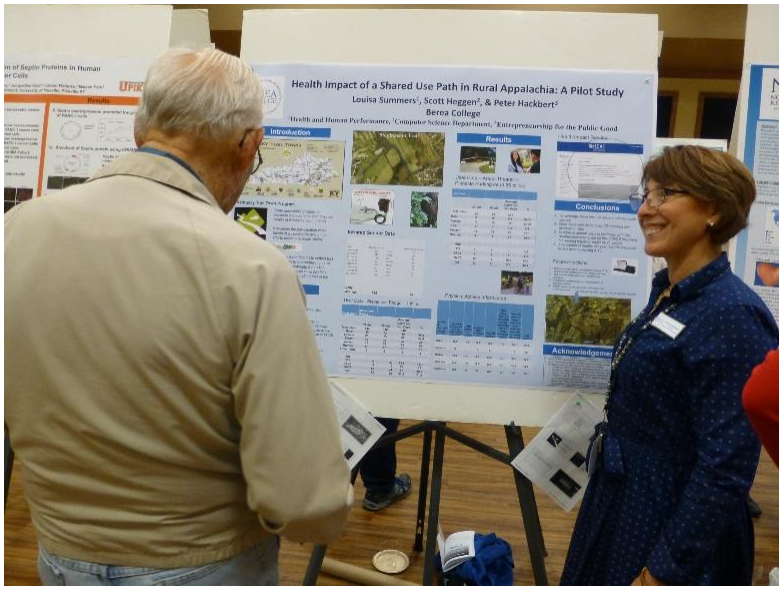
Funded by Berea College URCPP

Health Impact of a Shared Use Path in Rural Appalachia: A Pilot Study. Christopher Harris, Daryl Sullivan, Louisa Summers, Scott Heggen and Peter Hackbert. Health and Human Performance Department, Berea College, Berea, Kentucky, 40404.

Abstract

The purpose of this pilot study was twofold: 1) to collect trail user type, frequency, and duration on two separate multi use paths in a rural Appalachian city, and 2) to estimate the health impact of the trails. In addition, this study served to establish baseline measures prior to the completion of an addition shared use path which will connect the segments. Observational data, intercept user surveys, along with infrared sensors were used to estimate the number and type of users. Data were collected for 12 hours (6:00 am-6:00 pm) on two weekdays in July of 2017. Data from surveys were analyzed in tandem with information from the counts to develop an estimate of annual visits. Weather data (precipitation and temperature) from previous research was used to create relative ratios of use for each day of the year. The health impact model used the relationship between exposures to trail use, verses no use, to estimate all-cause mortality using the model established by Götschi & Hadden Loh (2017). The results indicated that the approximate number of annual users (primarily walkers) for both trails combined was 7,784. Out of this number of individuals, the number who would be expected to die if they were not walking regularly would be 71. In addition, the number of deaths per year that may be prevented by this level of walking was 13. Future data collection will provide annual usage, frequency and duration as the multi-use path is connected and therefore lengthened.

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Health Sciences Section)



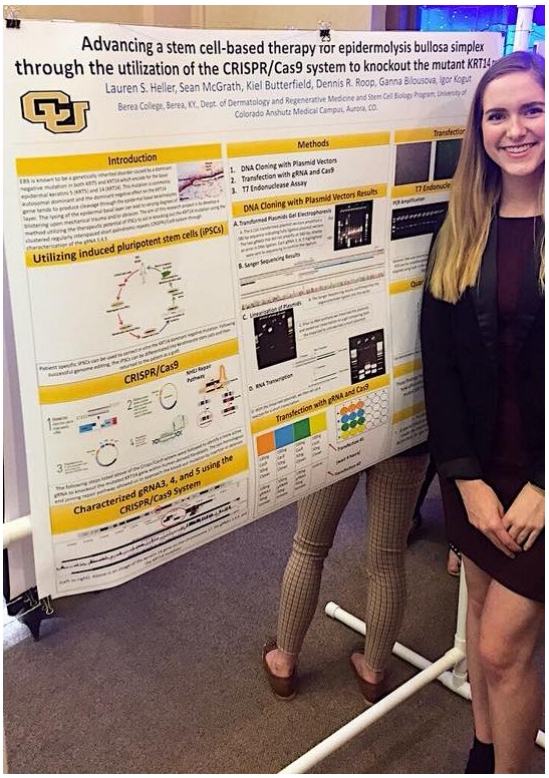
Advancing a Stem Cell-Based Therapy for Epidermolysis Bullosa Simplex Through the Utilization of the CRISPR/Cas9 System to Knockout the Mutant K14 Gene. Lauren S. Heller[1] and Sean McGrath[2]. Health and Human Performance Department, Berea College, Berea, Kentucky, 40404. [2]Gates Center for Regenerative Medicine in Denver, Colorado, 80045.

Abstract

EBS is known to be a genetically inherited disorder caused by a dominant negative mutation in both KRT5 and KRT14 which encode for the basal epidermal keratins 5 (K5) and 14 (K14). This mutation is commonly autosomal dominant and the dominant negative effect on the KRT14 gene tends to produce cleavage through the epidermal basal keratinocytes layer. The lysing of the epidermal basal layer can lead to varying degrees of blistering upon mechanical trauma and/or abrasion. The aim of this research project is to develop a method utilizing the therapeutic potential of iPSCs to aid in knocking out the KRT14 mutation using the clustered regularly interspaced short palindromic repeats (CRISPR)/Cas9 system through characterization of the gRNA 3, 4, 5.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Berea College Office of Internships and Career Development



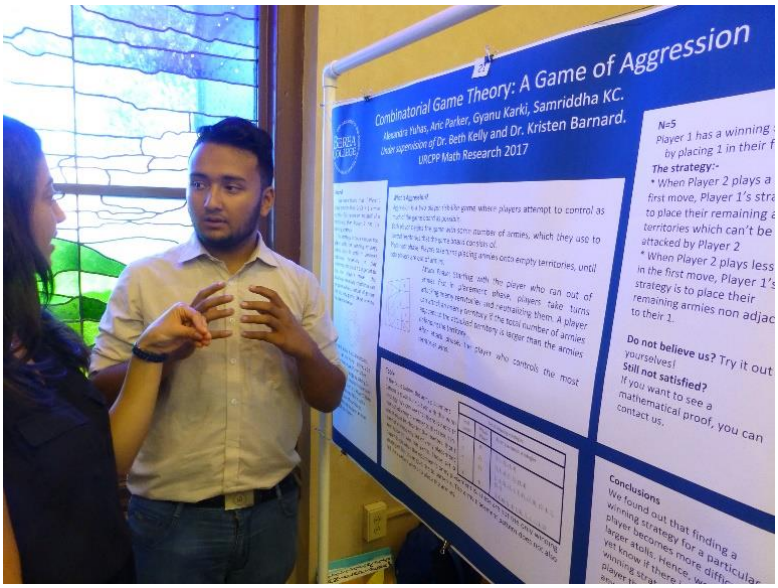
A Little Bit of Aggression Exploring Partizan Games. Gyanu Karki, Aric Parker, Alexandra Yuhas, Ly Linh Tran, Kristen Barnard and Beth Kelly. Mathematics Department, Berea College, Berea, Kentucky, 40404.

Abstract

"A Little Bit of Aggression" is a two-player game is based on Risk and is similar to one designed by Eric Solomon in 1973 as part of his book Games with Pencil and Paper. The basic game board is any map. Each player takes turns placing armies on empty regions of the map, and once all armies are placed the players take turns neutralizing their opponent's armies. Players alternate selecting an enemy region and counting all of their neighboring armies. If their combined strength is greater than the number of armies in the enemy region, the enemy armies are all destroyed. The game board for A little bit of aggression could be any map, but our specific project focused on playing the game on an atoll. Our ultimate goal was to find a general strategy for winning the game when played on a map of an atoll with n territories and each player would start with n armies. During the eight weeks of research, the students solved the game for several specific atolls of small size ($n \leq 8$) and determined and proved an upper bound on the number of armies that Player 1 can place during her first turn and still have an opportunity to win.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Berea College URCPP



A Summer at Summit: Applied Skills in the World of Civil Engineering. Logan Paisley[1] and Derek Motsch[2]. [1]Mathematics Department, Berea College, Berea, Kentucky, 40404. [2]Summit Engineering, Lexington, Kentucky, 40509.

Abstract

As students begin to look forward into entering the adult world, a growing concern becomes one of understanding how to apply our knowledge as critical thinkers and contributors to society. My summer was spent expanding my experience in civil engineering, and learning how to incorporate all skills from Berea College into my daily tasks.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Funded by Summit Engineering

Social Media and Politicization: A Rapid Participatory Action Research Study. Anna G. Keller. Nursing Department, Berea College, Berea, Kentucky, 40404.

Abstract

Media and academic accounts of recent politicizing events such as Arab Spring, Occupy Wall Street, and Donald Trump's presidential election frequently attribute these events to social media. Unexamined, this attribution conceals more than it reveals. Methods: In this qualitative study, I attempted to shed light on the nature of the relationship between politicization and social media. Using a brief participatory action framework employing a sequential process of concept-mapping and focus groups, six participants defined, examined, and described their experience with the political realm and social media, acquainted themselves with social theory about politicization, then theorized about their collective experience of the relationship between social media and politicization. Results: The six participants were ages 19-40; 1 male, 4 female, 1 non-gender binary; two black, two Asian, and two white. Two of them strongly agreed that social media had been a politicizing force in their life. One strongly agreed that social media had been a depoliticizing force. The concept mapping strongly associated "becoming political" with their response to an intensely affective experience (Anita Hill/Clarence Thomas, 9/11, etc.), felt that the political requires in-person, embodied relations, and strongly associated social media with intense affect and lonely individualization, even to the extent of personality splitting. The focus groups suggested that politicization is a response to real-world issues, and requires action in the real world, but the process may be accelerated or retarded when mediated by social media. The study was with a very small sample, and must be followed by research with a larger sample to test this hypothesis. Conclusion: There may be a relationship between politicization and social media, but it is unlikely to be linear.

40th Annual Appalachian Studies Conference, Virginia Tech, March 9-12, 2017, Blacksburg, Virginia (Oral Presentation)

1st Annual Kentucky Gender and Women's Studies Conference, September 16, 2017, University of Kentucky, Lexington, Kentucky (Oral Presentation)

Funded By Nursing Department

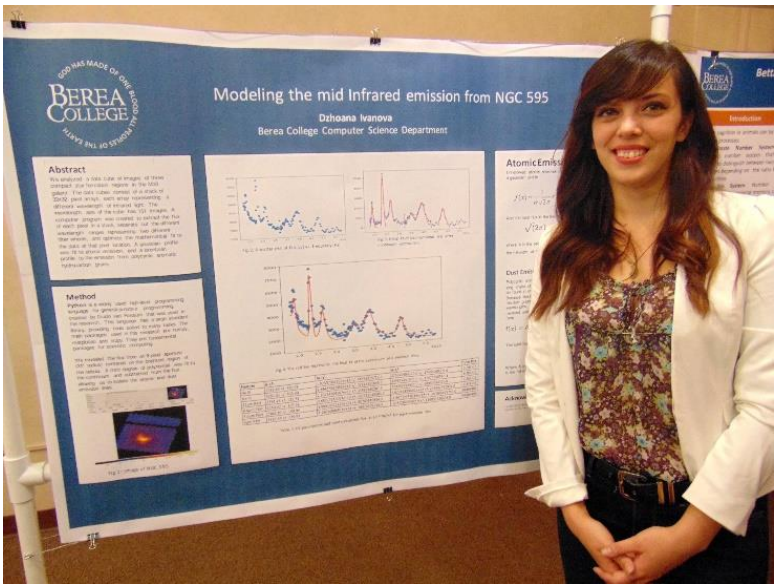
Modeling the Mid Infrared Emission from NGC 595. Dzhoana Ivanova and Tracy Hodge. Physics Department, Berea College, Berea, Kentucky, 40404.

Abstract

We analyzed a data cube of images of the compact star formation region NGC 595 in the M33 galaxy. The data cubes consist of a stack of 32x32 pixel arrays, each array representing a different wavelength of infrared light. The wavelength axis of the cube contained 151 images. A computer program was created to extract the flux of each pixel in a stack, separate out the different wavelength ranges representing two different filter wheels, (from 5 to 9.5 microns and from 9.5 to 15 microns) and optimize the mathematical fit to the data at that pixel location. A gaussian profile was fit to atomic emission from Nitrogen, and a lorentzian was fit to emission from polycyclic aromatic hydrocarbon dust grains, in order to better understand the physical and chemical environment of the nebula.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by URCPP



Variable Star Astronomy: Observing the Pattern of Change in Select Variable Stars. Kemo Jammeh, Mo Thi and Tracy Hodge. Physics Department, Berea College, Berea, Kentucky, 40404.

Abstract

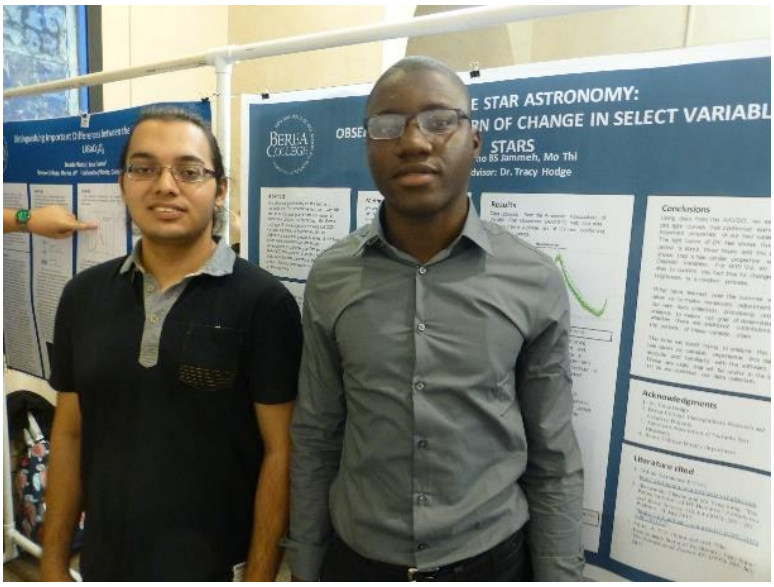
We obtained photometry on the intrinsic variable star Dy Her and the extrinsic variable star WW Vul. Observing and data collection was obtained using through the Berea College 16" telescope and an Alta U6 CCD camera equipped with standard filters. Additional data from previous years of the two stars were obtained from American Association of Variable Star Observers (AAVSO) data archive. Studying AAVSO's data with the data currently collected helps us search for long-term trends in the light curves of the two stars.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Physics and Astronomy Section)

The National Society of Black Physicists, November 3-5, 2017, Morehouse College, Atlanta, Georgia (Poster Presentation)

Funded by URCPP



Redesign of Introductory Physics Labs Using Arduinos. Troy Messina. Physics Department, Berea College, Berea, Kentucky, 40404.

Abstract

The Arduino microprocessor platform has made possible inexpensive prototyping and experimentation. The simplicity of programming the Arduino makes it a great tool for introducing students to computer programming, experimental design, sensor calibration, and data acquisition. We will explain the Arduino platform and show how it can be used in a variety of traditional introductory physics labs as well as some less typical introductory physics experiments.

American Association of Physics Teachers, August 28, 2017, Covington, Kentucky (Oral Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Oral Presentation-Physics and Astronomy Section)

Funded by Physics Department, Berea College

Imaging of the Spinal Cord in Pediatric Patients. Bhavesh Ramkorun[1] and Seth Smith[2]. [1]Physics Department, Berea College, Berea, Kentucky, 40404. [2]Vanderbilt University School of Medicine, Nashville, Tennessee, 37232.

Abstract

Diffusion Tensor Imaging (DTI) is a magnetic resonance imaging technique, based on water diffusion in tissue. Using Einstein's equation of diffusion and the Bloch equation, we can obtain quantitative diffusion indices, such as fractional anisotropy (FA), mean diffusivity (MD), radial diffusivity (RD), and axial diffusivity (AD). We analyzed DTI data from pediatric patients at Vanderbilt Children's Hospital to quantitatively evaluate the health of the spinal cord. We obtained DTI from 17 pediatric patients, aged 1 to 16 (mean: 7 years, SD; 4 years). Thirteen patients were identified as normal, and four patients were diagnosed with neurological disorders, including Chiari I, tethered cord, and an intra-spinal tumor. We hypothesize that quantitative diffusion indices could assist existing clinical MRI in the diagnosis and prognosis of some pathologies of the cord. We believe that our new data analysis can produce indices that may be able to differentiate between healthy spinal cord and disease. In this presentation we will review the physics and mathematical concepts utilized in DTI. Then, we will explain how we process the images to obtain DTI metrics. Finally, we will discuss our results, and how they may be potential clinical biomarkers.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Oral Presentation-Engineering Section: 3rd place Undergraduate Research Competition)

The International Society for Optics and Photonics, February 12, 2018, Houston, Texas (Poster Presentation: Medical Imaging)

American Physical Society March Meeting, March 5, 2018, Los Angeles Convention Center, Los Angeles, California (Oral Presentation)

Funded by Berea Office of Internships and Career Development

Designing Computer Based Interface Between X-Ray Generator, and Stages for Coded Aperture Coherent Scatter Spectral Imaging (CACSSI). Talha Rehman[1] and Anuj J. Kapadia[2]. [1]Physics Department, Berea College, Berea, Kentucky, 40404. [2]Duke University Hospital, Durham, North Carolina, 27710.

Abstract

Coherent scatter imaging has been shown to spatially differentiate healthy and cancerous breast tissue by providing contrast based on molecular structure in the tissue. The coherent scatter pattern associated with breast tissue has been demonstrated to consistently differentiate between adipose, fibroglandular, normal and cancerous tissues. To maximize the potential of existing CACSSI research system synchronized automation of the motor stages, the x-ray generator and the x-ray detector was planned. The system consists of Velmex motor stages, and the EMD-technologies x-ray generator which use their respective proprietary serial protocol. The MULTIX x-ray detector's API is C language based and therefore the system was planned to be integrated using Microsoft Visual Studios 2012 C++/Cli. The x-ray generator and motor stages were successfully programmed on a single computer platform to work synchronically.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Analysis of a Current-Mode Detector for the NOPTREX. Daniela Olivera Velarde[1], Troy Messina[1], Danielle Schaper[2] and Christopher Crawford[2]. [1]Physics Department, Berea College, Berea, Kentucky, 40404. [2]University of Kentucky, Lexington, Kentucky, 40506.

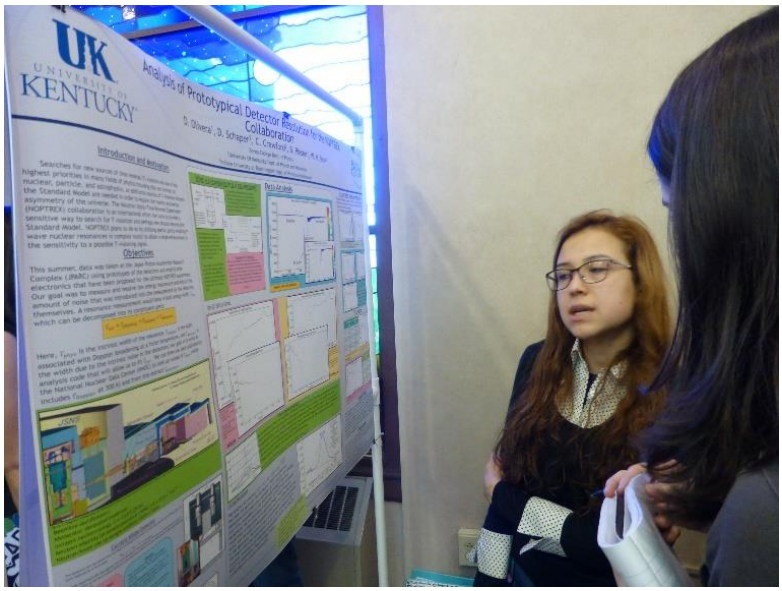
Abstract

Charge, Parity and Time reversal (CPT) conservation is one of the most fundamental assumptions in the Standard Model. One of the current problems in physics is the observed matter/antimatter asymmetry seen in the universe. In 1967, Sakharov proposed three conditions necessary for this asymmetry to occur, one of which is a need for processes that violate time reversal (T). The primary goal of the Neutron Optics Time Reversal Experiment (NOPTREX) Collaboration is to search for T-violation in polarized neutron transmission through a polarized nuclear target. This presentation will include an explanation of the NOPTREX experiment as well as preliminary measurements taken on indium and tantalum resonances at the NOBORU test beam at the Japan Proton Accelerator Research Complex (J-PARC) in June 2017 to test the functionality of the detector that will be used in the final experiment.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Oral Presentation-Physics and Astronomy Section: 3rd place Undergraduate Research Competition)

Funded by URCPP



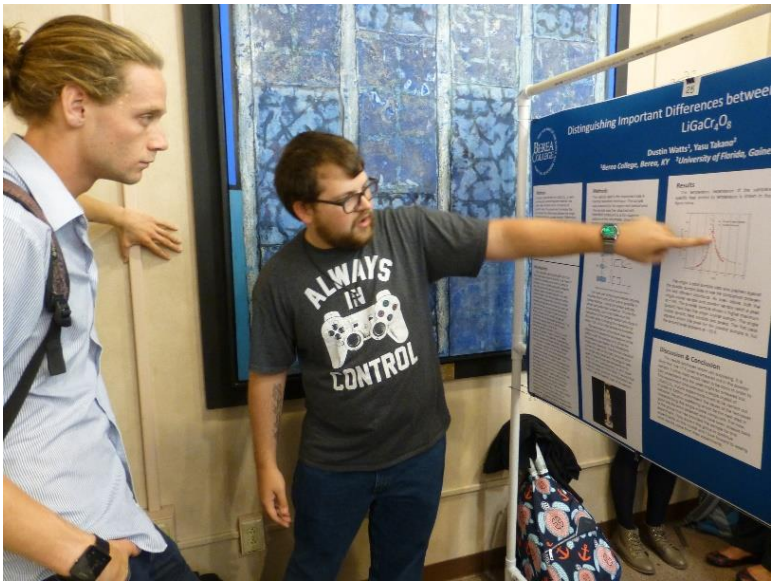
Distinguishing Important Differences Between the Sample Forms of LiGaCr4O8. Dustin Watts[1] and Yasu Takano[2]. [1]Physics Department, Berea College, Berea, Kentucky, 40404. [2]University of Florida**,** Gainesville, Florida, 32611.

Abstract

A single crystal sample of LiGaCr4O8, a newly synthesized antiferromagnetic material, has never been studied before concerning its specific heat. This experiment remedies that and reveals the differences between the single crystal sample and powder sample. Differences specifically between their specific heat measurements allow us to better understand their magnetic phase transitions. Applications are still mostly unknown for these materials, but characterization of a newly synthesized material allows the entire scientific community to benefit from it in many ways. A thermal relaxation technique was used to collect the specific heat data. Results show two peaks for the single crystal sample. These results are for the specific heat divided by temperature graphed against the temperature by itself. This two peak behavior was unexpected when comparing to the powder sample that had previously been studied. One reason could be that there are two phase transitions in the single crystal sample as opposed to one in the powder sample. Future experiments will include neutron scattering to determine for sure what is happening.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by REU program, University of Florida and the National Science Foundation



The Effect of Noise, Intention, and Time of Day on Memory. Alicia Bedolla and Dave Porter. Psychology Department, Berea College, Berea, Kentucky, 40404.

Abstract

This study looked at the effects of top-down and bottom-up processing on memory, as well as the influences of gender and time of day. The thirty-seven participants (22 female & 15 male) were from two Psychology 100 classes, one in the morning and one in the afternoon. Each class was presented with a series of 28 two-digit numbers on power point slides. Each number was followed immediately by an instruction to remember or not remember the number. Half of each set of numbers was presented in silence; the other half of the set with white noise. A significant main effect was found for instruction ($F_{(1, 33)}$=38.5, p<.001, η_p^2 = 0.52), which reflects intention's strong influence on memory. A significant main effect for the time of day the class participated in the study ($F_{(1, 33)}$= 5.44, p<.05, η_p^2 = 0.13) was also found with students in the morning session performing better than those in the afternoon session. Also a significant three-way interaction between instruction, group, and noise ($F_{(1, 33)}$= 4.33, p<.05, ηp2 = 0.11), suggests that the memory processes involved in this seemingly simple task are quite complex.

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Psychology Section: 3rd place Undergraduate Research Competition)

Funded by Psychology Department

Betta Fish (*Betta splendens*) Spontaneously Use the Combination of Numerosity and Surface Area During Discrimination Learning. Alicia Bedolla, Evelyne Rivera, Joey Barger, Jasmine Roman and Sarah Jones. Psychology Department, Berea College, Berea, Kentucky, 40404.

Abstract

Like many other species, fish have been found to represent numerical values in visual discrimination tasks. Little is known, however, about whether fish use number even when other stimulus properties are available. Some researchers propose that animals represent number only as a last resort, while others have found that monkeys will base their decision on numerical value if the numerical ratio is easy to discriminate. In this study, betta fish were trained to associate food with one of two visual stimuli that differed in both numerical value and cumulative surface area. Non-differentially reinforced probe trials indicated that betta fish were only able to discriminate between stimuli that contained both kinds of information. They performed at chance in discriminating between stimuli that differed only on numerical value, and between stimuli that differed only on cumulative surface area. These results indicate that fish may attend to a combination of these factors during discrimination training, leaving them unable to solve the discrimination with only one of the jointly-learned cues.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Psychology Section)

Funded by Berea College URCPP

Mobilizing Low-Income Populations: What are the Factors that Predict Collective Action? Jennifer Bentz, Jessica Cox, Bethany Howard, Aldrin Vinton and Wendy R. Williams. Psychology Department, Berea College, Berea, Kentucky, 40404.

Abstract

There are 43.1 million individuals living in poverty in the United States (U.S. Census Bureau, 2016). Although a number of social movement organizations are working hard for social change on behalf of low-income individuals (e.g., the Occupy Wall Street movement) only a small percentage of low-income people are politically active. Since one route to social change is through grassroots political pressure, it is important to focus on the factors that facilitate the participation of low-income individuals in collective action to challenge economic inequality. A vast literature in psychology, as well as in other disciplines including history, sociology, and political science, documents the factors that determine collective action (see van Zomeren, Postmes & Spears, 2008 for an overview and meta-analysis). The current project examined three different aspects of class in the United States: factors that facilitate engagement in collective action, the effect of discrimination on educational attainment, and one college's commitment to reversing the barriers to education for low-income students. Using survey methodology, Project #1 is a correlational analysis of the factors that facilitate or impede engagement in collective action against classism. Using experimental methodology, Project #2 compares four different interventions in their ability to alleviate stereotype threat in educational contexts among low-income students. Using archival methods, Project #3 examines Berea College's commitment to serving low-income students, including creating a timeline that shows when Berea stopped charging tuition and when Berea became exclusively dedicated to low-income students. Data were collected for two weeks in late June, but because of the current small sample sizes (Project #1 has 53 participants, Project #2 has 72 participants, and a partial timeline for Project #3 has been completed), data collection is will be ongoing into the fall 2017 semester. By understanding how various factors affect engagement in collection action, researchers will be able to aid groups interested in mobilizing to fight classism in a variety of contexts including housing, education, and employment.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

Funded by Berea College URCPP

Staying Behind: The Effect of Stereotype Threat on Unhelpful Perseverant Behaviors. Aaron Clark and Dave Porter. Psychology Department, Berea College, Berea, Kentucky, 40404.

Abstract

This study examined the effects of stereotype threat/boost and gender on an interactive decision-making task. Participants, all of whom were Berea College students and all of whom hailed, therefore, from low-economic status backgrounds, completed 30 trials of a simulation of the Monty Hall problem. The percentage of successful trials (i.e., those in which the correct alternative was chosen) was visible to the participant as s/he progressed through the trials. In one condition, the consent form contained a statement intended to induce stereotype threat based on the subject's limited economic resources; in the other condition, the consent form contained a statement intended to induce stereotype boost. Three dependent variables, performance style (switching or staying with the original choice), performance success (number of winning choices), and self-reported stress, were found to be significantly related to each other. It was found that those in the threat condition unwisely stayed with their first choice more frequently, performing poorly on the task, and reported greater stress compared to those in the boost condition. Additionally, females in both conditions unwisely stayed with their first choice more frequently than did males, leading to underperformance and increased stress. Further analyses revealed that the significant additive main effects of both gender and stereotype threat did not occur immediately, but developed over the span of the 30 trials.

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Oral Presentation-Psychology: 1st place Undergraduate Research Competition)

Funding by Psychology Department

The Effects of Gender, Task Difficulty, and Emotional Arousal on Perceptual Sensitivity. Enkhjin Enkhbold and Dave Porter. Psychology Department, Berea College, Berea, Kentucky, 40404.

Abstract

Perceiving the world accurately is an important skill. Abilities to focus, discover a threat in a crowd, and be aware of the complex and diverse environment around us define perceptual sensitivity. Enhancing one's perceptual sensitivity can improve one's cognitive functioning and quality of life. The current study examines the effects of emotional arousal, task difficulty, and gender on perceptual sensitivity. Forty students (18 males, 22 females) enrolled in a general psychology course were randomly assigned to two groups. One group participated in a mindfulness exercise, and the other viewed a dog-fighting video increasing sadness. The treatment (the mindfulness exercise and the emotional video) had a significant effect on participants' self-reported emotional state. Perceptual sensitivity was analyzed through d' in the Signal Detection Task in the Cog Lab Program. Results showed that task difficulty influenced performance as expected. However, emotional arousal and gender did not significantly affect one's perceptual sensitivity. No significant interactions were found.

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Memorial for Enkhjin Enkhbold-Psychology Section)

Funded by Psychology Department

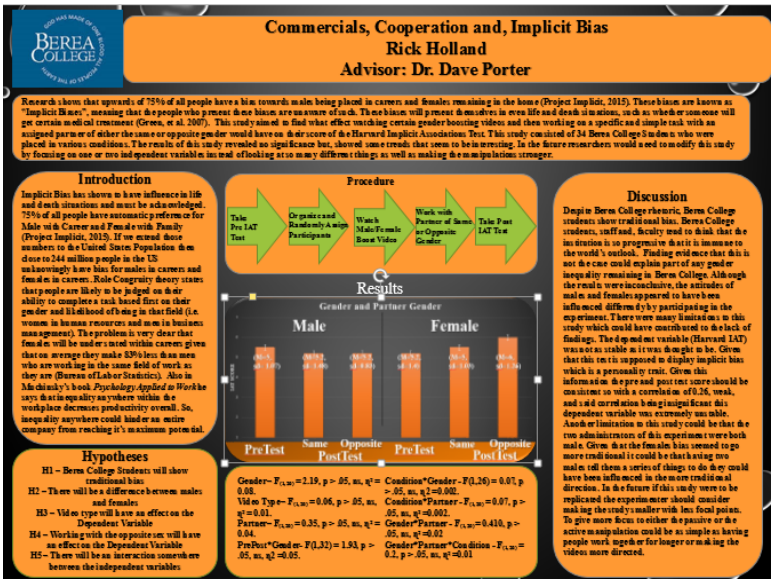
Implicit Gender Bias, Commercials, and Cooperation. Rick Holland. Psychology Department, Berea College, Berea, Kentucky, 40404.

Abstract

Research shows that 75% of us have a bias toward males pursuing careers and females remaining in the home (Project Implicit, 2015). Most people are unaware of this "implicit bias". However, biases such as these may even influence life and death decisions (Green, et al. 2007). This study sought to find what effect watching certain gender-related commercials and the experience of working on a simple task with an assigned partner of the same or opposite gender would have on participant's scores on the Harvard Implicit Associations Test. This study involved 34 Berea College students randomly assigned to various conditions. This study found that Berea College students have implicit biases similar to the general population. This study did not provide support for either of the influences or their interaction on participants' implicit associations. Future research should use fewer independent variables as well as consider ways to increase the strength of the manipulations of the independent variables.

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Psychology Section)

Funded by Psychology Department



Mashrou3 Insan (The Human Project): A Participatory Action Research Project on Displaced Youth's Mental Health and Well-Being. Khawla Nasser Al Deen[1] and Samar Zebian[2]. [1]Psychology Department, Berea College, Berea, Kentucky, 40404. [2]Lebanese American University in Beirut and NAHNOO Organization, Beirut, Lebanon.

Abstract

Prolonged exposure to war and adversity-related trauma places displaced individuals under the risk of high levels of psychological distress. Although Lebanon is the country that hosts the largest number of displaced Syrians, there is not sufficient research that explores psychological risk and protective factors among youth living outside of refugee camps. Mashrou3 Insan is a community driven intervention and research project that employs participatory and citizen science methods, as well as participatory theater to investigate and improve the psychosocial, mental health, and well-being conditions for youth and marginalized individuals in Lebanon. This research aims to achieve a co-constructed understanding of the phenomenology of youths' well-being and mental illness by working with youth and community partners to improve conditions and change policies that limit personal and collective well-being. Participants engaged in a three-phase participatory action research (PAR) design that involved research related activities, theater, and policy development. The final version of the Forum Theater play and the data from the survey were showcased during a town-hall meeting in Beirut, involving mental health stakeholders, community leaders, and policy makers.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Oral Presentation)

Funded by Bonner Scholars Summer of Service

Let's Face It: The Effects of Disclosure Type and Modality on Student Comfort. Caitlin Taulbee and Wendy Williams. Psychology Department, Berea College, Berea, Kentucky, 40404.

Abstract

Given that individuals with mental health disorders face barriers in accessing treatment (Mental Health America, 2017), the use of technology to deliver services is increasing. Mental health providers may question the efficacy of this model, given the assumed importance of the therapeutic relationship for comfort in client disclosure (Stiles, 1987). Previous research on clinical populations and the use of technology, such as videoconferencing, found that videoconferencing was just as effective for overall improvement in treating mental health issues and reducing symptoms as traditional face-to-face therapy (De las Cuevas, Arredondo, Cabrera, Sulzenbacher, & Meise, 2006). Outside of clinical populations, results about comfort in self-disclosure in online forums is mixed (Joinson, 2001; Taddei, Contena, & Grana, 2010). This study examined the perceived comfort in self-disclosure in a non-clinical population of 41 college students. Students were placed in either face-to-face (f2f) or video chat conditions where they had to use one of two types of disclosure. Specifically, open frame (impersonal information) or hidden frame (personal information), were elicited in a short conversation with the researcher. Consistent with the hypotheses, two independent main effects were found with increased comfort for both the open frame disclosure and video chat conditions. Although the highest scores were recorded for open frame disclosures with video chat (i.e., an additive effect), the results also indicate that individuals would be more comfortable in disclosing sensitive information via video chat than in the f2f condition. Future research should consider how technology could be used to influence help-seeking and positive therapeutic outcomes in non-clinical, limited-access populations.

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Psychology Section: 1st place Undergraduate Research Competition)

Funded by Psychology Department

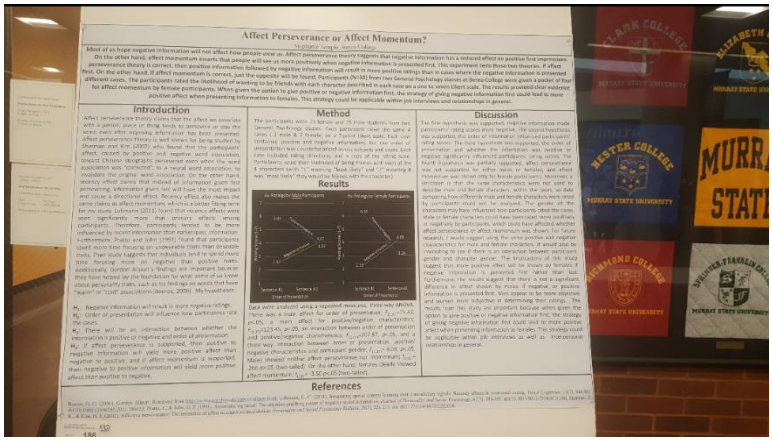
Affect Perseverance or Affect Momentum? Stephanie Temple and Dave Porter. Psychology Department, Berea College, Berea, Kentucky, 40404.

Abstract

Most of us hope negative information will not affect how people view us. Affect perseverance theory suggests that negative information has a reduced effect on positive first impressions. On the other hand, affect momentum asserts that people will see us more positively when negative information is presented first. This experiment tests these two theories. If affect perseverance theory is correct, then positive information followed by negative information will result in more positive ratings than in cases where the negative information is presented first. On the other hand, if affect momentum is correct, just the opposite will be found. Participants (N=38) from two General Psychology classes at Berea College were given a packet of four different cases. The participants rated the likelihood of wanting to be friends with each character described in each case on a one to seven Likert scale. The results provided clear evidence for affect momentum by female participants. When given the option to give positive or negative information first, the strategy of giving negative information first could lead to more positive affect when presenting information to females. This strategy could be applicable within job interviews and relationships in general.

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Psychology Section)

Funded by Psychology Department



Biomass Stove Design Project: Automated Fuel Feeder System. Constantine Botimer, Chance Davis, Jedidiah Radosevich, Chris True and Mark P. Mahoney. Technology and Applied Design Department, Berea College, Berea, Kentucky, 40404.

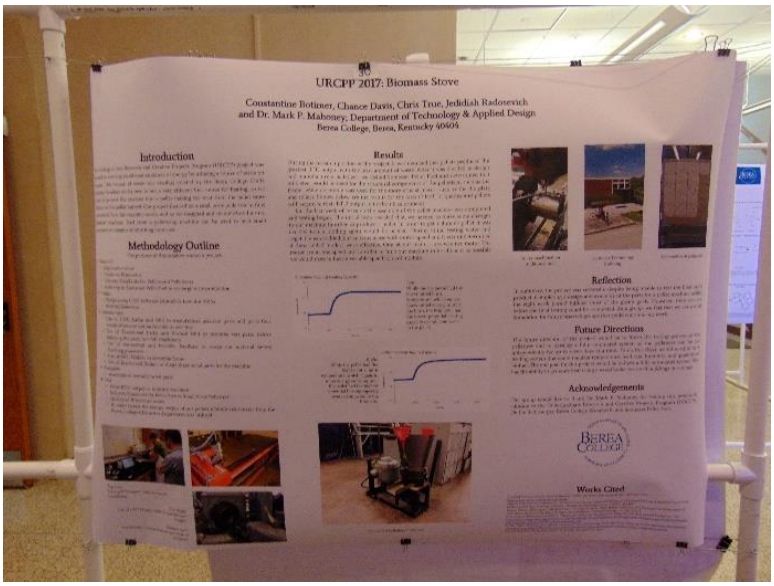
Abstract

The purpose of this project was the research, design, and fabrication of a biomass production and feeding system for the application of alternative heating methods for small structures on campus. The biomass material to be utilized consisted of the waste sawdust produced by college industry. The research group reviewed existing literature and current manufacturing practices. Samples of production grade materials were obtained for comparison testing with regard to energy potential. The current project concluded with the design and manufacture of a functioning prototype for initial pellet production for testing. Future research will continue to revise the prototype while producing viable comparison material for further data collection and analysis prior to implementation.

17th Annual Berea College Undergraduate Research Symposium, October 20, 2017, Berea College, Berea, Kentucky (Poster Presentation)

103rd Annual Meeting of the Kentucky Academy of Science, November 3-4, 2017, Murray State University, Murray, Kentucky (Poster Presentation-Engineering Section: 3rd place Undergraduate Research Competition)

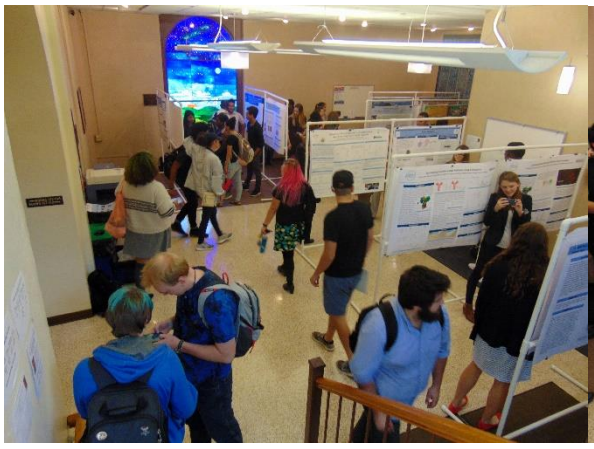
Funded by Berea College URCPP



17th Annual Berea College Undergraduate Research Symposium (BURS): October 20, 2017








103rd Annual Meeting of the Kentucky Academy of Science (KAS)
Murray State University: November 3-4, 2017