



Albion College

2014 Elkin R. Isaac Student Research Symposium

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The Twenty-Fifth Annual Elkin R. Isaac Student Research Symposium

Albion College | April 23-24, 2014

SCHEDULE OF EVENTS

Wednesday, April 23, 2014

7:30 p.m. Elkin R. Isaac Alumni Lecture: Hugh C. McDiarmid, Jr., '84
"Michigan's Clean Energy Success and Why Not
Everyone Is Thrilled"

Welcome: Michael L. Frandsen, Interim President
Speaker Introduction: Timothy N. Lincoln, Professor of
Geological Sciences; Director, Center for Sustainability
and the Environment

Towsley Lecture Hall/Norris Center 101

*Reception immediately following the program
Mitchell Museum, Norris Center*

Thursday, April 24, 2014

8:30-10:15 a.m. Student Research Platform Presentations

Forum #1
Norris Center 100

Forum #3
Norris Center 102

Forum #2
*Towsley Lecture Hall/
Norris Center 101*

Forum #4
Norris Center 104

10:45 a.m. Honors Convocation
Goodrich Chapel

1:15-4 p.m. Student Research Platform Presentations
See locations above.

4-5 p.m. Student Research Poster Session
Science Complex Atrium

7 p.m. Joseph S. Calvaruso Keynote Address: Richard B. Alley
"A Brighter Light at the End of the Tunnel: The Optimistic
Future of Energy and Environment"

Welcome: Michael L. Frandsen, Interim President
Honorary Degree Presentation: Thomas I. Wilch, Chair and
Professor of Geological Sciences
Speaker Introduction: Olivia C. Potoczak, '15
Goodrich Chapel

*Reception immediately following the program
Bobbitt Visual Arts Center Lobby*

Elkin R. Isaac Alumni Lecture



HUGH C. MCDIARMID, JR., '84

As communications director with the Michigan Environmental Council (MEC), Hugh McDiarmid works with more than 70 environmental, public health, and faith-based groups across the state dedicated to positive change through the political process. Based in Lansing, MEC works on issues such as clean energy, forest management, children's health,

environmental justice, transportation, climate change, and air pollution. Surrounded by the world's largest freshwater ecosystem, MEC is also heavily involved with issues affecting the health and preservation of the Great Lakes.

An English major at Albion, McDiarmid worked as a reporter and editor at the *Roscommon Herald-News* and the Grand Rapids-based *Advance Newspapers* before joining the *Detroit Free Press* in 1996. At the *Free Press*, McDiarmid won numerous state and national awards within news beats as varied as crime, politics, local government, and breaking news. He became the *Free Press*' environmental writer in 2003 where he broke news on issues including Great Lakes water pollution, lead poisoning in Michigan children, dioxin contamination downstream from Dow Chemical Co. in Midland, and efforts to protect public access to the Upper Peninsula's hardwood forests.

McDiarmid is a member of the East Michigan Environmental Action Council. He was a member of Albion's Delta Sigma Phi fraternity and active with Albion's club lacrosse team. McDiarmid lives in Farmington, where he keeps bees and plays goalie on a master's lacrosse team.

Joseph S. Calvaruso Keynote Address



RICHARD B. ALLEY

Teacher, researcher, and author Richard Alley is Evan Pugh Professor of Geosciences and associate of the Earth and Environmental Systems Institute at Pennsylvania State University. Alley has spent fourteen field seasons on great ice sheets in Antarctica, Greenland, and Alaska, gathering data on climate and sea level change. His development of future

climate change models earned him a seat on the United Nations' Intergovernmental Panel on Climate Change, which was a co-recipient of the 2007 Nobel Peace Prize.

Alley is past chair of the National Research Council's Panel on Abrupt Climate Change, and has provided climate change information to top federal officials including a U.S. vice president and members and committees of the U.S. Senate and House of Representatives. Committed to educating the general public as well, Alley was presenter for the PBS program *Earth: The Operators' Manual*. He wrote a companion book for the PBS series and a popular account of climate change and ice cores, *The Two-Mile Time Machine*, which was named Phi Beta Kappa's Science Book of the Year in 2001.

Alley is a member of the National Academy of Sciences and has earned numerous research awards, including the Tyler Prize for Environmental Achievement, the Heinz Prize, the Reville Medal of the American Geophysical Union, and the Seligman Crystal of the International Glaciological Society. He has won four teaching awards at Penn State, and his public service has been recognized with the American Association for the Advancement of Science Public Engagement with Science Award, the Public Service Award of the Geological Society of America, and the American Geological Institute Award for Outstanding Contribution to Public Understanding of the Geosciences.

Alley will receive the National Academy of Sciences' triennial Arthur L. Day Prize and Lectureship April 27, 2014.



Student Presentation Schedule | Thursday, April 24, 2014

FORUM #1 – NORRIS 100

8:30	Eric Fink (Harris)	Synthesis of Bimetallic Complexes for Catalytic Reactions: A Kaiserslautern Adventure
8:45	Alissa Reddy (Harris)	Phosphonoethylated Polyglycerol Amphiphiles: Liposomal Formulations for Bone Targeting
9:00	Elizabeth Tuma (Rabquer)	The Effect of sJam-C on Monocyte Migration through the ERK Pathway
9:15	Adam Kudirka (Rabquer)	Investigation of the Inhibition of Angiogenesis by sJAM-B via the Src Kinase
9:30	Stefan Blachut (Zellner)	Statistical Analysis of Lunar Impact Glasses
9:45	Joseph Thomas (Madhok)	Bio-fuels: An Exploration in Environmental and International Ethics
10:00	Noelle Scelina (Wilch)	Characterization of Non-Uniform Groundwater Input into the Upper Kalamazoo River, Michigan
10:15	Heidi Keller (T. Lincoln)	The Relationship between Groundwater Seepage and Nitrate Concentrations in the Kalamazoo River, Michigan
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1:15	Luke Salbert (Saville)	Investigation of an alpha-synuclein-Proteasome Interaction: A Model for Parkinson's Disease in <i>Drosophila</i>
1:30	Hannah Allgaier (Rabquer)	Growth and Functionality of Monocytic Leukemia Cells Grown in Non-Animal-Based Media
1:45	Hannah Pankratz (McRivette)	Using Remote Sensing and Field Spectrometry to Discriminate Maize and Soybeans for Cropland Mapping Applications
2:00	Benjamin Hinks (Wilch)	Reconstruction of Eruptive Sequences of Cinder and Spatter Cones in the Ice Springs Volcanic Field of the Black Rock Desert, Utah
2:15	Laura VerHulst (Bollman)	A Markov Chain Analysis of the National Football League's Overtime Rule
2:30	Carl Pressprich (Seely)	Securing Wireless Networks through Radiofrequency Identification
2:45	Alysandra Ganem (Zellner, Miller)	Elton John Meets Aeronautics: Design and Construction of a Subsonic Rocket with Glider Recovery System
3:00	James Reynolds (T. Lincoln)	Fluid Inclusion Study of Gold-Bearing Quartz Veins in the Southern Black Hills, South Dakota
3:15	David Huggins (Menold)	Constraining Extent of Metasomatism with Oxygen Isotope Geochemistry of Zircons from UHP Orthogneiss, North Qaidam, China
3:30	Alex Schumaker (Rohlman)	Kinetic and Structural Analysis of the Group I Catalytic Ribozyme
3:45	Stephanie Sanders (Metz)	Progress in Developing a More Sustainable Shaped Nanoparticle Synthesis on Carbon Substrates

FORUM #2 – TOWSLEY LECTURE HALL/NORRIS 101

8:30	Peter Blair, Tsiporah Davis, Timothy DeLong, Christina Hallam (McWhirter)	Religious Commitments in the Albion College Classroom
8:45	Jane Finkel (Parr)	Comparing and Contrasting Requiems
9:00	Stuart Nolton (Ball)	A Discussion on Mozart's Piano Concerto No. 12 in A Major K.414
9:15	Christopher Herweyer (Sacks)	A Presidential Home: A History of 501 E. Michigan Avenue
9:30	Gerard Battersby (Dick)	The Commercial Frontier: Business, Kinship, and the Building of the Great Lakes Socio-Economic Network, 1825-1840

9:45	Xinya Dai (Ball)	Joaquín Rodrigo: Concerto de Aranjuez
10:00	Rebecca Ruthberg (Ball)	The Haydn Trumpet Concerto: Movements I (Allegro) and II (Andante)
10:15	Corey Brittain (Cook)	Creating Iconic Hair and Makeup Styles for the Stage
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1:15	Christopher Blaker (Dick)	What Were Their Names? Albion College's World War II Honor Roll
1:30	Allison Veltkamp (Dick)	1,000 Letters Home: A Michigan Soldier's Journey during World War II
1:45	Tiffany Newsom (McWhirter, Kelemen)	To Poland and Back: Reflections on the Holocaust
2:00	Emma Stapley (Collar)	Artistic Creation as a Means of Overcoming the Horrors of Trench Warfare
2:15	Olivia Potoczak (Christensen)	Investigating Creative Nonfiction: Climate Change and the Younger Generation
2:30	Elizabeth Nykamp (Jordan)	Jane Austen and Anglicanism
2:45	Christina Hallam (Mourad)	The Labyrinth: The Journey of a Pagan Symbol through Christianity
3:00	Bridget Ruff (Wickre)	The Importance of Light and Shadow in the Prints of Edward Hopper
3:15	Megan Connolly (Roberts)	Demon Rum and Fallen Drunkards: The Displacement of Blame in Nineteenth-Century American Temperance Fiction
3:30	Shonté Daniels (Mesa)	Formaldehyde: Poems
3:45	Sara Jongeward (Mesa)	Exploring the Graphic Novel as an Artistic and Narrative Medium

FORUM #3 – NORRIS 102

8:30	Ori Shewach (Christopher)	Big Five, Social Dominance, Authoritarianism, and Morality as Predictors of Social Beliefs
8:45	Sarah Domke (Hill)	Religious Fundamentalism, Cognitive Rigidity, Right-Wing Authoritarianism, and Gender Norm Conformity
9:00	Grace Dougherty (Harnish)	Anthropology of Obesity: Physicians' Perspectives, Paradigm Shifts, and New Directions
9:15	Camille Haslinger (Francis)	Should You Always Think Before You Speak? The Relationship between Social Anxiety and Speech Production
9:30	Marissa Cloutier (Albertson)	A Multidisciplinary Approach to Combatting Onchocerciasis
9:45	Nick Diamond (Rabquer)	Pathogenesis of Malaria
10:00	Alexandra Yaw (Jechura)	Sleep and Nutrition: A Study of the Relationship with Athletic Performance
10:15	Danielle Wesolowicz (Wieth, Christopher)	Dr. Google: How the Ordering of Search Results of Health Information Online Affects Health Anxious Individuals
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1:15	Emma Schaff (Wieth, Francis)	Paper Clips, Puzzles, and Parents: Investigating the Relationship between Family and Creativity
1:30	Holly Paxton (Wilson)	Spacing Effect in Escape and Punishment Learning of Earthworms
1:45	Dannie Fountain-Jagodzinski (Carlson)	Implications of Body Modifications on the Hiring Process
2:00	Scott DesRosiers (White, Kennedy)	Alarm Call Modification and Behavioral Responses to Predatory Threats in Breeding House Wrens
2:15	Rachel Kohanov (Kennedy, White)	Nestling Responses to Alarm and Food Calls of Adult House Wrens (<i>Troglodytes aedon</i>)
2:30	Bradley Baker (Olapade)	Assessment of Microbial Community Dynamics in Aquatic and Adjacent Terrestrial Environments: A Comparative Study along the Kalamazoo River

(continued on next page)



2:45	Jennifer Polinski (Kennedy)	Investigating Algal Symbionts in Corals from St. Lucie Reef, Florida
3:00	Debvarsha Mandal (Albertson)	The Roles of <i>nina</i> and <i>norpA</i> Genes in Conducting Photo-Transduction in <i>Drosophila melanogaster</i>
3:15	Lucas Martin (Skean)	A Survey of Parkage Trees in Albion, Michigan Economic Neighborhoods and Public Housing
3:30	Jack Manquen (Albertson)	Host-Microbe Interaction in <i>Drosophila</i> and <i>Wolbachia</i>
3:45	Allison McClish (Albertson)	Cytoplasmic Incompatibility and Infection Frequency of <i>Wolbachia</i> in a Michigan Population of <i>Drosophila melanogaster</i>
4:00	Edwin Benkert (Rabquer)	Community Species Composition of Diptera in Sand Shore and Wetland Habitat
4:15	Anna Ward (Kennedy)	Prevalence and Intensity of <i>Aeromonas hydrophila</i> in Frog Populations in South-Central Michigan

FORUM #4 – NORRIS 104

8:30	Mackenzie Novak, Andrea Walles, Nicolas Deltombe, Arnaud Guillemain, Lawrence Loncle, Benjamin Peron (Nolan, Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—Innov/Screens
8:45	Alex Decker, Justin Fragnoli, Christina Khim, Julien Bellenger, Guillaume Dupuy, Clemence Lentin, Pierre-Matthieu Plaze (Nolan, Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—Electronic Cigarette
9:00	Zachary Francis, Jonathan List, Ross Muniga, Nabil Benabdelkader, Zaina Krafat, Rene Ngadi, Idris Sanhaj (Nolan, Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—SLG 3D Printing
9:15	Brennan Ackerman, Jacob Davis, Dannie Fountain-Jagodzinski, Philippe Aubriot, Remi Blot, Quentin Decroix, Quentin Habert (Nolan, Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—Sail-Connect
9:30	Richard Atkins, Caitlin McClorey, Brad Melpolder, Arnaud Carnielli, Vincent Concedieu, Laur Douzobeu, Aurelien Fakir, Medhi Sabity (Nolan, Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—FullFit
9:45	Heather Waldron (Hooks)	The Volcker Rule: The Impact of Bank Inventories on Risk and Volatility
10:00	Sarah Erdman (Hooks)	Turnover and Closed-End Fund Discounts
10:15	Rebecca Guntz (Alozie)	Reflective-Based Teacher Evaluation: A Case Study

1:15	Robert Cermak (Chase)	Mounds for and by Whom? Using Animal Bones to Determine the Function of Ancient Native American Earthen Pyramids in Indiana
1:30	Walter Kacher, III (Verduzco-Baker)	How Hip-Hop Is Reviving Detroit
1:45	Joshua Cohen (Melzer)	Wharf Rats: Ex-Addicts Still on Tour with the Grateful Dead
2:00	Alex Bowman (Dick)	Robert F. Kennedy's 1968 Presidential Campaign: What Might Have Been?
2:15	Salaina Catalano (Grossman)	A New Deal for Michigan: The Story of the Works Progress Administration
2:30	Ellen Riina (Myers)	Targeting Tourists: The Murals of Belfast
2:45	John Fleming (Madhok)	The Budgetary Reform and Control Act: An Interdisciplinary Critique of the Financial Crisis in the United States

3:00	Daniel Myckowiak (Dabney)	Civic Disengagement and Socioeconomic Inequality: The Role of Labor Unions in Michigan
3:15	Nora Riggs (Jensen-Abbott, Franzen)	Music Therapy as Aftercare for Sex-Trafficking Survivors
3:30	Chelsea Cutright (Chase, Harnish)	The Intersection of Immigration and Sexuality: Michigan Voices for LGBT Issues in U.S. Immigration
3:45	Justin Wike (Hagerman)	Small Vicious Wars: U.S. Counterinsurgency, 1962-2014
4:00	Kevin Rhee (Cocks)	When Politics Meets Science: A Comparative Analysis of the Wartime Human Experimentation Programs in Nazi Germany, Imperial Japan, and the United States from the 1930s to 1994

POSTER SESSION – SCIENCE COMPLEX ATRIUM, 4-5 P.M.

Amy Bell (Betz, Wieth)	Exercise Intensity and Creativity
Kathleen Casebeer (Lewis, Bieler, Smeltekop)	The Early History of the Study of Chemistry at Albion College
Erica Earl (McCaffrey)	Effects of High-Velocity Impacts and Catalytically Active Minerals on Simple Sugars
Stephen Foster (Elischberger)	Facts, Misconceptions, and the Science of Psychology
Ethan Frick, Michael Sears (Saville)	Using Comparative Genomics Analysis to Study Heterochromatin of the Fourth or 'Dot' Chromosome from Two Species of <i>Drosophila</i>
Pietro Geisler (Saville)	Using Comparative Genomics Analysis to Study Heterochromatin from Two Species of <i>Drosophila</i>
Jessica Glazier (Elischberger)	Boys Don't Cry: Adult Perceptions of Children Who Defy Gender Roles
Rebecca Guntz, Brian Wu (Bollman)	Wheels: How to Divide by Zero
Mitchell Hehl (Moreau)	Summer 2013: My Internship with D.C. Cook Nuclear Power Plant
Benjamin Hinks (Feagin)	Combining Google Earth Street View and Photography
Geoffrey Hissom (Saville)	GEP Gene Annotation of <i>D. biarmipes</i> Dot Chromosome, Contig43
Jalyn Ingalls (Betz, Jechura, Baker)	Leadership Development in 5th and 6th Graders
Atraeyu Ishmon, Joe Silvestri (Saville)	Comparative Genomic Analysis of a Region (Contig51) of the Fourth Chromosome from Two Species of <i>Drosophila</i>
Zach Kribs (Keyes)	Evidence-Based Treatment in a Clinical Setting
Shanti Madhavan (Shanton)	Music: A Vessel for Learning English as a Second Language
Carlos Matti (Metz)	Nanoscale Palladium Catalysis on Charcoal and Diatomaceous Earth
Evan New (Bartels)	Invertebrate Paleontology of the Late Mississippian Bayport Limestone, Bellevue, Michigan
Ellen Redner (Wilch)	Reconstruction of Eruption Conditions Based on Crater Rim Stratigraphy at Miter Crater, Ice Springs Volcanic Field, Black Rock Desert, Utah
Brittney Stanton (Saville)	Annotating Fosmids in <i>Drosophila</i>
Miranda Voege (Shanton)	Integrating Art and Movement into English Lessons at Pará School, Costa Rica
Angela Walczyk (Saville)	Comparative Genomic Analysis of a Region (Contig59) of the Fourth Chromosome from Two Species of <i>Drosophila</i>
Bian Wang (Bartels)	Eocene Snakes from the Green River Basin, Wyoming
Emily Werner (Betz)	Knowledge of Physical Activity and Nutrition Recommendations in College Students



The Student Research Symposium at 25

Albion College's Student Research Symposium this year celebrates its 25th anniversary. The first symposium, held on April 20, 1990, involved seven students making presentations describing their research projects in the sciences. Three years later, a poster session was added. The program has been offered annually since its founding and now features the work of approximately 100 students recommended by their faculty mentors. Representing a broad array of disciplines, the symposium has become the College's principal showcase for outstanding student research, scholarship, and creative activity.

The Elkin R. Isaac Endowment

The Elkin R. Isaac Endowed Lectureship was created in 1991 by Albion College alumni in honor of their former teacher, coach, and mentor, Elkin R. "Ike" Isaac, '48. Isaac taught at Albion from 1952 to 1975 and coached basketball, track, and cross country. He led his teams to one Michigan Intercollegiate Athletic Association basketball title, six consecutive league championships in track, and three cross country championships. He also served as the College's athletic director and created Albion's "Earn, Learn, and Play" program and the "Albion Adventure Program." In 1975, Isaac joined the faculty at University of the Pacific and became athletic director in 1979. He retired there in 1984. He passed away in August 2013.

Proceeds from the endowment have been used to bring a noted scholar or public figure to campus each year for a lecture. In 1997, the lectureship was expanded and became associated with the College's annual Student Research Symposium, which now bears Isaac's name.

Family and friends of Ike Isaac have joined us for the symposium this year to commemorate Isaac's impact in the lives of so many Albion students and to share in the campus community's tradition of honoring high academic achievement.

The Isaac Endowment Committee

Cedric W. Dempsey, '54
Thomas G. Schwaderer, '56
Leonard F. "Fritz" Shurmur, '54 (deceased)
John R. Taylor, '55

The Joseph S. Calvaruso Keynote Address Endowment

Joseph S. Calvaruso, '78, and his wife, Donna, established an endowment fund in 2005 to support the annual Elkin R. Isaac Symposium keynote address. The keynote address now bears Calvaruso's name. An Albion native, he currently serves as executive director of the Gerald R. Ford Presidential Foundation in Grand Rapids. Before joining the foundation, he was senior vice president and director of risk management for Mercantile Bank in Grand Rapids. Active in the Republican Party on the state and national levels, Calvaruso is a member of the Albion College Board of Trustees.

In keeping with Calvaruso's personal goal to "try different things in life," the keynote endowment ensures the symposium will continue to provide an exceptional variety of presenters from the arts, sciences, social sciences, and humanities.

Past Isaac Symposium Speakers

Elkin R. Isaac Alumni Lecture

Emilio DeGrazia, '63 (1999)
James Misner, '66 (2000)
John Vournakis, '61 (2001)
Joseph Serra, '56 (2002)
Denise Cortis Park, '73 (2003)
John Porter, '53 (2004)
Elkin Isaac, '48 (2005)
Joseph Calvaruso, '78 (2006)
Eileen Hebets, '94 (2007)
James Beck, '97 (2008)
James Gignac, '01 (2009)
Kristen Neller Verderame, '90 (2010)
John Ferris, '89 (2011)
Lawrence Schook, '72 (2012)
Michael Harrington, '85 (2013)

Joseph S. Calvaruso Keynote Address

Wade Davis (1999)
Stephen Jay Gould (2000)
Doris Kearns Goodwin (2001)
Kurt Vonnegut (2002)
Salman Rushdie (2003)
Gloria Steinem (2004)
Edward O. Wilson (2005)
Regina Carter (2006)
Steven Pinker (2007)
Carl Hiaasen (2008)
David Trimble (2009)
Mira Nair (2010)
Annie Leonard (2011)
Laurie Garrett (2012)
Alexander McCall Smith (2013)

The 2014 Isaac Student Research Symposium Committee

Craig Bieler (Chemistry)
Sarah Briggs (Communications Office)
E. Dale Kennedy (Biology/Brown Honors Program)
Lisa Lewis (Chemistry)
Beth Lincoln (Geology)
Ian MacInnes (English/FURSCA)
Anne McCauley (Art and Art History)
Michael Van Houten (Stockwell-Mudd Libraries)
John Woell (Academic Affairs)

Abstracts of Student Presentations

BRENNAN ACKERMAN, '15

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—Sail-Connect)



HANNAH ALLGAIER, '14

Growth and Functionality of Monocytic Leukemia Cells Grown in Non-Animal-Based Media

Faculty Sponsor: Bradley Rabquer
Major: Biochemistry
Hometown: Ortonville, Mich.

It is well known that slaughterhouses have detrimental effects on the environment, but many people do not know that numerous cows are pregnant at the time of slaughter. Fetuses taken from these slaughtered cows are harvested for a substance called Fetal Bovine Serum (FBS), which is a common food supplement used in cell culturing protocols. Since the scientific community provides a large demand for FBS, exploring different options for cell culturing serums would reduce the need for FBS, and therefore the need for slaughterhouses. The goal of this research was to refine a non-animal-based reconstruction of FBS for culturing monocytic leukemia cells. These cells were cultured in either standard or alternative FBS media, and experiments were performed to determine the effect of the alternative FBS on both cell growth and migration.

Supported by: FURSCA

RICHARD ATKINS, '14

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—FullFit)



BRADLEY BAKER, '14

Assessment of Microbial Community Dynamics in Aquatic and Adjacent Terrestrial Environments: A Comparative Study along the Kalamazoo River

Faculty Sponsor: Ola Olapade
Major: Biology
Hometown: Ann Arbor, Mich.

Water and soil samples were collected weekly during the summer and monthly during the fall from terrestrial and aquatic environments from selected locations along the Kalamazoo River in order to compare microbial biomass both spatially

and longitudinally. Several standard microbiological approaches (including viable counts and nucleic acid staining) were employed to analyze the samples in order to elucidate the presence of indigenous microbial communities at the river sites. Additionally, concentrations of different nutrients (e.g., nitrates and phosphates) at these sites were measured concurrently during the study period. Each environmental variable as well as the measured nutrient content was compared to the microbial biomass in order to discern which variables had the largest effect on the biomass in the water and soil samples. It was also found that spring runoff had a significant effect on biomass, probably due to influx of bacterial cells from the adjacent terrestrial soil environments into the river channels. Overall, this study further reveals the complexity associated with delineating microbial ecology of aquatic environments, especially with the challenges in implicating linear relationships between each of the variables measured, e.g., oxidation reduction potential [R=0.1], conductivity [0.07], pH [0.051], and the microbial biomass. The results from this study are important as it relates to public health and water quality with potential to enhance current knowledge and strategies regarding water quality in aquatic systems.

Supported by: FURSCA



GERARD BATTERSBY, '14

The Commercial Frontier: Business, Kinship, and the Building of the Great Lakes Socio-Economic Network, 1825-1840

Faculty Sponsor: Wesley Dick
Major: Public Economics and Policy
Hometown: Farmington Hills, Mich.

In the first half of the nineteenth century, the Northwest Territory remained a wild periphery to many Americans based in the Northeast. At this time, a vast majority of our national population had yet to venture beyond the Atlantic coast, and the burgeoning United States government did not yet possess the resources to explore and effectively map the West. Instead, businessmen transplanted themselves into the West from the East, facilitating some of the most impactful early mapping and development in the region. Even before mid-nineteenth-century railroad networks provided unprecedented access to the West, the port communities located on the Great Lakes were hotbeds for young businessmen who utilized their esoteric knowledge of the West to efficaciously invest eastern capital in a new commercial frontier. Early partnerships, as well as connections between the businessmen located along Great Lake eastbound shipping routes, spawned a small but influential commercial kinship network, and this network played



a significant role in facilitating the rise of some of the largest port-cities in the Midwest. Scholars such as William Cronon choose to focus on Chicago as the “gateway to the West” following the arrival of the railroads, but such an assertion can be supplemented by evidence that this pre-railroad business network provided the necessary scaffolding for cities like Detroit, Milwaukee, and Chicago to handle industrial demand once western railroads did arrive. By utilizing primary sources from the Newberry Research Library in Chicago, Illinois, my work aims to illustrate the role that this network played in the development of these Great Lake commercial communities during their early days.

Supported by: Newberry Research Fellowship



EDWIN BENKERT, '14

Community Species Composition of Diptera in Sand Shore and Wetland Habitat

Faculty Sponsor: Bradley Rabquer
Major: Biology
Hometown: Burt, Mich.

A few studies have characterized the composition of shore-fly (Diptera: Ephydriidae) communities in semi-aquatic sand shore and wetland habitats. However, studies characterizing community abundance and richness of all Diptera inhabiting these habitats are wanting. Scattered literature suggests that Diptera play a pivotal role moving energy into semi-aquatic food webs. A total of 7,647 insects were collected from sand shore, mud shore, and mixed sedge habitats. Shore flies and fruit flies (Diptera: Chloropidae) constitute 17.2% and 34.5%, respectively, of the total community. However, when communities are compared, the Ephydriidae exhibit a higher richness (r) than Chloropidae in the habitats studied. Both Ephydriidae and Chloropidae are primary consumers of vascular vegetation, a source of food web energy. Also, other shore-fly species are consumers of detritus material, algae, and cyanobacteria. In sand and mud habitats that lack vascular vegetation, Ephydriidae are most abundant. As vegetation cover increased during spring 2013, the number and abundance of other families of Diptera, notably Chloropidae, also increased. Shore flies are able to recolonize disturbed habitat quickly, and community species composition changes during the season. A comparison of diversity indices suggests that sand shore, mud shore, and mixed sedge habitats are not significantly different, while the species assemblages are distinct. An understanding of the Diptera community structure of sand shore and wetland habitats may provide a foundation for the study of energy movement into semi-aquatic ecosystems as well as determine possible indicator species to judge the success of wetland restorations.



AMY BELL, '14

Exercise Intensity and Creativity

Faculty Sponsors: Heather Betz, Mareike Wieth
Major: Exercise Science
Hometown: Farmington Hills, Mich.

It has been shown that poor mental cognition is a risk factor for mortality at all stages in life. Therefore, cognition is a good assessment of general health. A study by Singh-Manoux et al. (2004) demonstrated that participants who reported low levels of weekly physical activity consistently scored lower in short-term memory, inductive reasoning, and verbal fluency tests. Research has also shown that intensity appears to be a critical component in the effectiveness of an exercise program on cognitive function. In a study of 217 participants, aged 60-89 years old, it was found that intensity, but not necessarily amount of physical activity, significantly improved cognitive functioning (Brown et al., 2012). There is a substantial amount of information on exercise’s effect on reaction time, and a moderate amount regarding its effect on executive functions (Yukai et al., 2009), but very little research on exercise’s effect on creativity. In a study involving 60 college students, creativity was assessed in relation to timing of exercise. Results found that creative potential improved significantly after exercise, while there was no difference in creative performance directly after the exercise compared to two hours after the exercise (Blanchette et al., 2005). Further research is needed in the areas of both exercise’s effect on creativity, and more specifically, various exercise intensity levels on creative function. The purpose of this study was to investigate the relationship between exercise intensity levels in older adults and the creative component of mental cognition.



STEFAN BLACHUT, '15

Statistical Analysis of Lunar Impact Glasses

Faculty Sponsor: Nicolle Zellner
Majors: Physics, Mathematics
Hometown: St. Clair Shores, Mich.

How often the Earth and the Moon have been hit by extraterrestrial objects, such as comets and asteroids, over the past 4.5 billion years is not well known. However, in the proper context, lunar impact samples, formed during impacts on the Moon, can provide useful information to help address this issue. In order to assess the impact rate in the Earth-Moon system, data from over 700 lunar impact glasses collected at the Apollo 12, 14, 15, 16, and 17 landing

sites were evaluated. The $^{40}\text{Ar}/^{39}\text{Ar}$ age, composition, and collection location of each impact glass were analyzed in order to determine when and where each impact glass was formed. Using statistical analysis software, glasses were sorted into groups based on similarities in age and composition to determine which glasses formed in the same impact, a detail which helps to prevent overestimating the impact rate. It thus provides a direct measure of how frequently the Moon and Earth experienced impacts. Certain studies suggest that the Moon, and with it the Earth, experienced an increase in the impact rate at various times in solar system history, and this study offers insight into the likelihood of those claims.

Supported by: FURSCA—Bruce A., '53, and Peggy Sale Kresge, '53, Science Fellows, NASA Lunar Advanced Science and Exploration Research Program, National Science Foundation Astronomy and Astrophysics

Jacobsen have pointed out in their acclaimed work, religion is *No Longer Invisible* in the university.

Our research project seeks to answer our four questions. A grant from the Wabash Center for Teaching and Learning in Theology and Religion has allowed us to develop a survey to be administered to Albion students currently enrolled in a religious studies course. By gathering information about student attitudes toward personal and academic discussions about religion in their classes, we hope to help chart the waters for instructors seeking to navigate religious commitments in the undergraduate classroom.

Supported by: The Wabash Center for Teaching and Learning in Theology and Religion. (The Wabash Center is funded by Lilly Endowment Inc. and located at Wabash College in Crawfordsville, Indiana.)



PETER BLAIR, '14

Major: Philosophy
Hometown: Portage, Mich.

TSIPORAH DAVIS, '14

Major: Religious Studies
Hometown: Macomb Township, Mich.

TIMOTHY DELONG, '14

Major: Religious Studies
Hometown: Troy, Mich.

CHRISTINA HALLAM, '14

Major: Religious Studies
Hometown: Overland Park, Kansas

Religious Commitments in the Albion College Classroom

Faculty Sponsor: Jocelyn McWhirter

Do students at a small, church-affiliated liberal arts college think that classroom discussions about religious commitments cohere with its academic mission? How comfortable are traditional undergraduates with such discussions? How do they perceive their religious obligations in the classroom? How do they handle those obligations?

These four questions pertain to the evolving relationship between religion and higher education in the United States. Through the late nineteenth century, much of higher education was necessarily religious education. In contrast, the twentieth-century academy regarded religion as a private matter. Now, however, many instructors are searching for a happy medium. Religious commitments still do not dominate the undergraduate curriculum, yet the current multicultural student population makes it difficult for the academy to ignore them. As Rhonda and Douglas



CHRISTOPHER BLAKER, '14

What Were Their Names? Albion College's World War II Honor Roll

Faculty Sponsor: Wesley Dick
Major: History
Hometown: Farmington, Mich.

On December 7, 1941, the Japanese attack on Pearl Harbor brought America into World War II, the most monumental struggle in history, so encompassing that it poses problems on how to tell the story. Recently, Ken Burns, documentary film maker, set out to narrate America's participation in the war. Realizing this was an impossible task, Burns decided to tell the story of the war through the experiences of four American towns. His highly acclaimed series reminded the public of the value of local and regional history.

Inspired by Ken Burns' *The War*, my departmental honors thesis on "Michigan and World War II" includes a chapter on Albion College. What was the impact of the war on the campus? Male students were drafted and others enlisted. Over 1,000 Albion College alumni served as members of the armed forces. How many Albion College students and alumni were wounded or killed during the war? Forty-one Albion College alumni were killed or listed as missing in action. No American town or campus could escape the war's impact, and, as Burns has written: "Nothing would ever be the same."

There is another catalyst for this particular focus. When one walks the halls of the Albion College Library, it is hard to miss a most impressive plaque headed with the words: Albion College Honor Roll for the World War. This honor roll includes nearly 500 names of Albion College men who served, including the names of 12 who died in World War I. It is a fitting memorial. But something is missing. Where is the memorial for those who served in World War II? One goal of this study is to tell the story of the impact of the war on Albion College and in the process identify those from Albion College who served and those who gave their lives, in the hope



that the College can provide a fitting memorial, an Honor Roll for World War II. The names and faces of Albion College's World War II Honor Roll of those killed and missing in action will be revealed in this presentation, and ideas for a memorial will be discussed.

Supported by: FURSCA



ALEX BOWMAN, '14

Robert F. Kennedy's 1968 Presidential Campaign: What Might Have Been?

Faculty Sponsor: Wesley Dick
Majors: Economics and Management, History
Hometown: Jackson, Mich.

The decade of the 1960s was a tumultuous time: civil rights demonstrations, the assassination of President John F. Kennedy, urban race riots, and anti-Vietnam War protests. By 1968, a divided America appeared to be coming apart. On March 16, Robert F. Kennedy entered the Senate Caucus Room with his wife, Ethel, and nine of their ten children. Standing where his brother, John, had stood in 1960 when he was 42, 42-year-old Robert echoed his brother's words: "I am announcing today my candidacy for the presidency of the United States." And thus the 1960s decade and the momentous year of 1968 took another turn.

Robert Kennedy's campaign would be centered on healing America's racial divisions and ending the Vietnam War. Appealing to the hearts and minds of the young, the poor, the working class, and minorities, his presidential campaign lasted 85 days, culminating in his victory in the California Democratic primary on June 4. The Democratic National Convention would be held in Chicago in August, and there were still challenges ahead for Kennedy. But there was reason for optimism as he spoke to his supporters at the Ambassador Hotel in Los Angeles on primary election night: "... We can start to work together. We are a great country and a compassionate country. I intend to make that the basis for running. ... My thanks to all of you, and on to Chicago. Let's win there." Kennedy flashed a "V" for victory. These were the last political words that Kennedy spoke. Moments later, he was shot by an assassin. He died on June 6.

This presentation will examine Robert Kennedy's 85-day presidential campaign. As the "last hope" for 1968 America, what did Robert Kennedy represent to his supporters? It will also explore the question: What might have been? If Kennedy had lived, could he have won the nomination? If elected president, what kind of president might he have been?



COREY BRITTAIN, '14

Creating Iconic Hair and Makeup Styles for the Stage

Faculty Sponsor: Amber Cook
Major: Theatre
Hometown: Port Huron, Mich.

My presentation is a journey back through time leading to the exploration of the culture and hairstyles of women, which have prevailed through time to become iconic symbols of the past. Through my research I gained insight into the complex methods women would go through to present themselves as attractive in a societal setting. My main goal was to somehow adapt these iconic styles for the modern theatre setting.

The six eras represented in my research range from Elizabethan to a 1920s finger wave. Each era presented its own hurdles when trying to be adapted for the stage due to the limitation of materials available. Extensive research was done to discover what materials these women used to create their classic looks.

To complete the look, makeup was the finishing touch and helps signify each distinct time period. The evolution of makeup has drastically shifted on several occasions. Women have resorted to radical measures to attain the new "in" image of beauty, ranging from the use of hazardous chemicals to a more natural look. To achieve these looks for the stage, different techniques must be used which allowed for different materials and the safety of the actors.

Though iconic looks have changed throughout the years, these looks are still applicable to the stage. The plays that are described as period pieces often call for the actors to be wigged, completing the overall look. Knowing how to adapt styles for the stage can create a more realistic experience for the audience and the actors.



KATHLEEN CASEBEER, '17

The Early History of the Study of Chemistry at Albion College

Faculty Sponsors: Lisa Lewis, Craig Bieler, Nicole Smeltekop
Majors: Chemistry, English
Hometown: Plymouth, Ind.

This poster provides a visual overview of the early history of the study of chemistry at Albion College from the mid-1880s to the 1930s. Primary sources from the Albion College Library Archives were used to understand the development of the science curriculum and the beginning of the Albion College Chemistry Department. The historical timeline will include details about the faculty, infrastructure, student involvement, industrial collaborations, and the development of the curriculum and major requirements.

Supported by: FURSCA



SALAINA CATALANO, '14

A New Deal for Michigan: The Story of the Works Progress Administration

Faculty Sponsor: Andrew Grossman
Majors: Political Science, History
Hometown: Rochester Hills, Mich.

The Works Progress Administration (WPA) was perhaps the most iconic program of President Franklin Roosevelt's New Deal. Offering work ranging from constructing highways to performing plays, the WPA gave unemployed men and women jobs and hope during the Great Depression. Michigan was one of the states with a large number of participants and a great deal of funding; its WPA played a significant role during this period characterized by massive expansion of federal power. Analysis of WPA documents, correspondence, and propaganda has resulted in the production of a comprehensive history of the Michigan WPA. The successes and failures, criticisms and praises of the Michigan WPA provide an interesting insight into the legacy of this huge work relief program and beg the question: Could something on this scale ever be endeavored again?

Supported by: FURSCA—Robert M. Teeter Research Fellowship Endowment

ROBERT CERMAK, '14

Mounds for and by Whom? Using Animal Bones to Determine the Function of Ancient Native American Earthen Pyramids in Indiana

Faculty Sponsor: Bradley Chase
Major: Anthropology
Hometown: Grand Ledge, Mich.

One thousand years ago, Native Americans in the eastern woodlands of the U.S., today known as Mississippians, built monumental pyramids of earth. What were these mounds used for? Who in Mississippian society used them? In summer 2013, I participated in an archaeological research project at Angel Mounds, a Mississippian archaeological site in southern Indiana. Here, I focus on the zooarchaeological artifacts, animal bones and shells, from two different earthen mounds at the site. The animal bones from three excavation areas on two different mounds were analyzed to determine whether these earthworks at Angel Mounds were used primarily as simple residences or if they had more specialized religious or political functions for the people who lived there. In addition to studying animal bones from new excavations, I also compared my findings to collections of animal bones excavated in 1965 during earlier research at the site. This comparison allowed me to examine archaeological contexts that had already been excavated while exploring potential biases in past research on mound function. Specifically, my findings

indicate that Mounds F and/or A likely played host to late prehistoric feasts and/or elite consumption at the Angel site. The probable occurrence of such unusual meals tells us not only about meat consumption practices at Angel Mounds, but may also have the ability to inform on the relationships between power and ritual in Mississippian society.

Supported by: National Science Foundation Research Experiences for Undergraduates (REU)



MARISSA CLOUTIER, '14

A Multidisciplinary Approach to Combatting Onchocerciasis

Faculty Sponsor: Roger Albertson
Major: Biology
Hometown: Grosse Ile, Mich.

Millions of people in developing countries have been infected by nematodes that carry the bacterium *Wolbachia*. When released by nematodes, *Wolbachia* often cause an inflammatory immune response in infected individuals that gives rise to a disease called onchocerciasis, which is the world's second-leading infectious cause of blindness. Currently, several global programs and a relatively successful drug treatment regimen are being used to combat this disease, but due to cost and safety concerns, social factors, and the changing biological nature of *Wolbachia*, the infection continues to ravage populations in Africa and Central America. For this reason, new drugs and treatment strategies are being sought to combat the disease.

In this study, an experiment was conducted to further characterize the effect of drug treatments on *Wolbachia* titer in *Drosophila simulans* with the goal of identifying novel drugs that are successful in reducing *Wolbachia* infection. Drugs were administered to flies through yeast-based food, and immunofluorescent and DNA staining techniques were used to score *Wolbachia* titer in ovaries and embryos. This project also includes an analysis of existing programs aimed at combatting onchocerciasis, the challenges these programs face, and improvements that must be made before this disease can be eradicated. Scientific, political, and social commitment is required to support onchocerciasis control programs and carry out the research necessary to eliminate this disease. This project aims to address onchocerciasis from all of these perspectives, which is an approach that is too often overlooked when addressing tropical disease.

Supported by: Prentiss M. Brown Honors Program



JOSHUA COHEN, '14

Wharf Rats: Ex-Addicts Still on Tour with the Grateful Dead

Faculty Sponsor: Scott Melzer
Major: Anthropology/Sociology
Hometown: Pleasant Ridge, Mich.

This presentation will cover the Wharf Rat society, a subculture of Grateful Dead fans who have made the decision to go sober and provide each other a sober support system. These fans, who were once 'on the bus' touring with the band, embroiled in a culture of drugs and alcohol use, have now come to enjoy the music and concert experience without the help of substances. Employing a grounded theory method, I use interviews with Wharf Rat members and Deadheads, document analysis of official newsletters and pamphlets, and literature focusing on Alcoholics and Narcotics Anonymous to analyze this unique subculture. My findings focus on the processes and efficacy of Wharf Rats trying to get and stay clean in drug-fueled environments, the relationship the Wharf Rats have with Alcoholics and Narcotics Anonymous, and comparable groups that have emerged among followers of bands similar to the Grateful Dead.

Supported by: FURSCA



CHELSEA CUTRIGHT, '14

The Intersection of Immigration and Sexuality: Michigan Voices for LGBT Issues in U.S. Immigration

Faculty Sponsors: Bradley Chase, Allison Harnish
Major: Anthropology
Hometown: Willis, Mich.

Lesbian, gay, bisexual, and transgender (LGBT) immigrants/asylees in the United States face numerous challenges unique to their identification within distinct marginalized social groups. My research focuses on the federal legal landscape, the organizational support in southern Michigan, and micro level issues of individual agency within the LGBT immigrant/asylee community. My research is particularly relevant due to the recent changes in the legal landscape with the 2013 reversal of the Defense of Marriage Act (DOMA). I have explored how these legal changes are affecting immigration particularly for LGBT identified individuals and couples. I have also looked at the many organizations that provide legal support for such individuals and couples in southern Michigan. Through fieldwork and interviews in Detroit, Ann Arbor, and Kalamazoo, I look at how these organizations work together as well as provide distinctly different services and resources for this population. Finally, I explore issues unique to LGBT immigrants/asylees from the perspective of two individuals, one from Uganda and one from Sudan. In so doing, I identify cultural differences, individual access to legal services, and issues involving self-identification as common themes of difficulty for this population.

Supported by: FURSCA



MEGAN CONNOLLY, '14

Demon Rum and Fallen Drunkards: The Displacement of Blame in Nineteenth-Century American Temperance Fiction

Faculty Sponsor: Jessica Roberts
Major: English (Creative Writing)
Hometown: Wayne, Mich.

Temperance novels are a lesser studied facet of the Temperance Movement's massive social—and eventually political—reform. They are a type of popular literary propaganda circulated through the public alongside short stories, poetry, and pamphlets. Didactic and sensationalistic, these novels dramatized alcohol addiction in order to advance the agenda of the Temperance Movement. Using the Newberry Library's rich selection of primary sources, I examine the way in which Temperance novels cast the habitual drunkard as the victim of a larger societal ill instead of as an active agent capable of controlling his own fate. External agents of influence such as tavern-keepers, the drunkard's peer group, and alcohol itself are blamed for the drunkard's spiral to a life of violence, poverty, and abuse. Because of this, I argue that the displacement of blame from the drunkard to external agents was a propagandist technique that furthered the Temperance Movement's agenda to eradicate the sale, production, and use of alcohol in America.

Supported by: ACM Newberry Seminar in the Humanities and the Newberry Library, Chicago, Illinois.



XINYA DAI, '14

Joaquín Rodrigo: Concerto de Aranjuez

Faculty Sponsor: James Ball
Majors: Economics and Management, Music Performance
Hometown: Kunming, China

Joaquín Rodrigo (1901-1999) is one of the most significant Spanish composers of the twentieth century. Concerto de Aranjuez was a composition for classical guitar and orchestra, and is one of the most famous classical guitar concertos of all time. The piece was written during Spain's Civil War when Rodrigo fled to France. Inspired by the gardens at Palacio Real de Aranjuez in central Spain, it expresses Rodrigo's love for his wife and his homesick feelings for Spain. The adagio in B minor is the most famous movement of the three movements; it is introduced by the English horn, with a soft accompaniment by the guitar and strings. The ornamentation from the guitar solo

leads the movement into a mysterious atmosphere. A trill leads to the initial tension of the movement. The guitar gradually builds the tension in the cadenza which ends with a series of Spanish-style strumming. The movement ends with a variation of the main slow melody of guitar and strings.



SHONTÉ DANIELS, '14

Formaldehyde: Poems

Faculty Sponsor: Helena Mesa
Majors: English, Spanish
Hometown: New Brunswick, N.J.

Formaldehyde is a common chemical that is in embalming fluids, a chemical used to restore the natural appearance of a body after death. The formaldehyde in the embalming solution preserves the corpse by temporarily preventing its deterioration. Though the body appears somewhat alive, the body becomes an empty husk. In my title poem, as well as the complete collection, I explore the decomposition of a family that, from the outside, still appears to be thriving but struggles to live together harmoniously. "Formaldehyde" is a traditional collection of contemporary poetry focusing on the exploration of my own life and role within my family. The collection features different forms, including haikus, sonnets, and blues as well as forms I created during FURSCA in 2012.

In my first collection of poetry, I worked to create a diverse set of poems, though similar in theme, which exemplified my skills as a poet. One of my goals as a narrative poet was to experiment with images and music, in order to create a strong collection that felt repetitive or one note. This project has allowed me to examine my own skills, and discover which parts of my writing have strengthened throughout my years as a poet and which still need work. Ultimately, I want these poems to be polished, in order to one day submit them to literary journals.

Supported by: FURSCA

JACOB DAVIS, '15

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—Sail-Connect)

TSIPORAH DAVIS, '14

(See Peter Blair, '14, Tsiporah Davis, '14, Timothy Delong, '14, Christina Hallam, '14)

ALEX DECKER, '15

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—Electronic Cigarette)

TIMOTHY DELONG, '14

(See Peter Blair, '14, Tsiporah Davis, '14, Timothy Delong, '14, Christina Hallam, '14)



SCOTT DESROSIERS, '15

Alarm Call Modification and Behavioral Responses to Predatory Threats in Breeding House Wrens

Faculty Sponsors: Douglas White, E. Dale Kennedy
Majors: Biology, History
Hometown: Shelby Township, Mich.

This research tested whether breeding house wrens produce unique alarm calls in response to different kinds of nest threats. House wrens are faced with many predators, including conspecifics, each requiring a particular response to ensure nestling and parent survival. Alarm call characteristics may vary by threat or possess functional information, coded messages meant to influence the behavior of the receiver. In experiments at the Whitehouse Nature Center in summer 2013, I incited alarm calls by using hawk, snake, and house wren decoys, as well human interference. Through a system of sound and video recorders placed in and around the nest box, the house wrens' vocal and behavioral responses to each decoy were recorded. Alarm calls were compared visually using Avisoft Sound Analysis Software for differences in frequency, pitch, intensity, and duration. Although no threat provoked unique notes, the snake decoy elicited significantly more notes per scolding period than the other threats or control. This variation in alarm call behavior suggests functional information is present within these scolds, meaning house wrens can distinguish alarm calls triggered by snakes from those triggered by other predators, allowing them to make a proper defensive response.

Supported by: FURSCA—Jean Bengel Laughlin, '50, and Sheldon Laughlin Endowment for Student Research



NICK DIAMOND, '15

Pathogenesis of Malaria

Faculty Sponsor: Bradley Rabquer
Major: French
Hometown: Rochester, Mich.

The Centers for Disease Control estimates 219 million cases of malaria occurred worldwide in 2010, and 660,000 people died. Most of those deaths were of children. About 3.3 billion people live in regions with high malaria prevalence. The organization states that 91% of cases were in the African region, followed by 6% in the Southeast-Asian region and 3% in the Eastern Mediterranean region.



During the spring 2014 semester, I researched the pathogenesis of malaria to better understand its immunologic mechanisms. The parasite *Plasmodium* uses the *Anopheles* mosquito as a vector for transmission. *P. falciparum* is associated with acute infection. The parasite's sporozoite infects a liver cell and within six days divides to produce thousands of merozoites. After the liver cell ruptures, *Plasmodium* again invades red blood cells and divides. Within two days, the parasite generates 8-24 merozoites. These are released into the blood after hemolysis. The process is cyclic. Other individuals infected with *P. vivax* or *P. ovale* can live with the parasite in a dormant stage for 2-4 years. Clinical manifestations include fever, muscle aches, chills, sweats, headaches, nausea, vomiting, and general malaise.

This semester's research is aligned with my plan to serve as a physician in French-speaking Africa. Malaria prevention, diagnosis, and treatment are a focus of global health clinicians working in developing countries.

that RWA may partially account for the relationship between RF and prejudice toward others. The present research suggests that RWA may also account for the relationships between RF and people's adherence to stereotypical gender roles.

Supported by: FURSCA



GRACE DOUGHERTY, '14

Anthropology of Obesity: Physicians' Perspectives, Paradigm Shifts, and New Directions

Faculty Sponsor: Allison Harnish
Majors: Biochemistry, Anthropology
Hometown: Canton, Mich.

This research explores historical and current perspectives on the causes, effects, and proposed solutions of what has been coined the "obesity epidemic" in the United States in order to understand the ways in which this epidemic is culturally constructed. In America today, body-size and adiposity are often framed in terms of neoliberal economic models of individual morality, personal responsibility, and consumer choice. Educational campaigns and policy solutions aimed at combating the obesity epidemic reflect these values and are proving to be ineffective to reduce America's average body size and address the root causes of obesity—which are discussed in this study. In addition to reviewing historical and contemporary perspectives on obesity, this study also explores the ways in which the attitudes of physicians practicing in southeast Michigan reflect the changing perceptions of the obesity epidemic today. Overall, this project asks: What role does anthropology play in finding solutions to the "obesity epidemic"? And, how can a culturally relative and intersectional view of obesity help us to understand obesity's causes and effects and, perhaps most importantly, to inform policy that will better the lives of American people?

Supported by: Prentiss M. Brown Honors Program



SARAH DOMKE, '14

Religious Fundamentalism, Cognitive Rigidity, Right-Wing Authoritarianism, and Gender Norm Conformity

Faculty Sponsor: Eric Hill
Major: Psychological Science
Hometown: Holland, Mich.

Recent research has suggested that religion may play a role in conformity to gender norms (Vincent et al., 2011; Ali et al., 2008). Religious fundamentalism (RF) in particular has been associated with gender role conformity among men (Ward & Cook, 2011) as well as sexism among both men and women (e.g., Hill et al., 2010). Given that rigid cognitive styles and ideologies partially account for the relationship between RF and general prejudice (e.g., Brandt & Reyna, 2010, Hill et al., 2010, Johnson et al., 2012), the present study sought to combine these two lines of research and examine the extent to which cognitive rigidity and right-wing authoritarianism (RWA) might account for the RF-gender role conformity relationship.

In this study, 252 adults (119 female, $M_{age} = 35.52$, $SD_{age} = 12.29$) were recruited through Amazon Mechanical Turk. They completed measures of RF, masculine and feminine gender role conformity, need for closure, need for cognition, RWA, conservatism, and social desirability.

Results of the present study support previous findings that RF predicts conformity to gender roles (Vincent et al., 2011). However, controlling for cognitive and ideological rigidity reduced many of these associations. Instead, RWA emerged as a consistently strong predictor. These findings are in line with previous research by Johnson et al. (2012) suggesting



ERICA EARL, '14

Effects of High-Velocity Impacts and Catalytically Active Minerals on Simple Sugars

Faculty Sponsor: Vanessa McCaffrey
Major: Chemistry
Hometown: Marshall, Mich.

Organic molecules, such as simple sugars, have been found in meteorites on Earth and in molecular clouds in space accompanied by catalytically active minerals. During billions of years of bombardment, these space materials were brought to Earth via comet, asteroid, and meteorite delivery. These impacts were previously thought to obliterate any

organics on the object. However, simulated shock experiments on organic materials such as amino acids and PAHs show that the compounds not only survive impact but also undergo reactions to form additional molecules. In these experiments, we report on the survivability and reactivity of two simple sugars found in extraterrestrial objects under similar conditions. Using the flat-plate accelerator at NASA Johnson Space Center, combinations of minerals and simple sugars were subjected to high-velocity impacts, and the resulting samples were analyzed by gas chromatography/mass spectrometry. New polyhydroxylated compounds were found in the samples, showing that both the minerals and the impact were acting as catalysts.

Supported by: FURSCA—Bruce A., '53, and Peggy Sale Kresge, '53, Science Fellows, NASA



ERIC FINK, '14

Synthesis of Bimetallic Complexes for Catalytic Reactions: A Kaiserslautern Adventure

Faculty Sponsor: Clifford Harris
Majors: Chemistry, German
Hometown: Pleasant Lake, Mich.

Bimetallic catalysis is an interesting combination of two metal groups being coordinated to a ligand. Binuclear complexes composed of different metals are considered to be more active than their monometallic analogues. These metal groups should theoretically have additive effects, providing greater catalytic activity as well as more efficient use of materials for reactions. Different ligand structures were previously explored. From these complexes, the *N,N,N*-donor center of the bispyrimidinylpyridine compound in this project is useful in coordinating hard Lewis acid metals, whereas the phosphine donor centers are able to better coordinate with late transition metals. Functionalizing the 6- and 6'-positions as well as the amino-phosphine bridge of this complex may also alter the catalytic reactivity.

The chain length of the alkyl group is limited to an ethylene or a propylene group. Other systems do not allow any communication between the metals in the complex. A further variation of the phosphine is also possible.

Supported by: German Academic Research Exchange Service (DAAD)



SARAH ERDMAN, '14

Turnover and Closed-End Fund Discounts

Faculty Sponsor: Jon Hooks
Majors: Mathematics, Economics and Management
Hometown: Portage, Mich.

This research seeks to further investigate the quandary of closed-end fund discounts known as the "four-piece puzzle." While other researchers have taken a behavioral approach (investor sentiment, etc.), this study will explore empirical data on several variables, including some Fama-French factors. Using a fixed effects model, the effects of turnover, three-year beta, price/book, median market capitalization, expenses, and income were measured in this study.

The hypothesis of this study is that an increase in turnover, price/book, three-year beta, or median market capitalization should result in an increase in the discount of the fund. This is because increased turnover increases the expenses of the fund (manager's fees, taxes, etc.), while on average does not increase the value of the fund significantly (professional investors normally do not beat the market). The theory behind the price/book hypothesis is that a higher price/book can signal to investors that the fund is overvalued, so the demand for the fund will decrease, and therefore the fund will sell at a discount. The findings support the hypothesis that turnover and price/book both impact the discount of closed-end funds as expected, with the statistical significance of price/book weaker. Neither three-year beta nor median market capitalization was found to have a statistically significant effect on discount.

Supported by: Economics and Management Department



JANE FINKEL, '14

Comparing and Contrasting Requiems

Faculty Sponsor: Clayton Parr
Major: Music
Hometown: Mackinac Island, Mich.

The Requiem Mass is composed to celebrate the reception of deceased souls into heaven.

These works carry considerable meaning and weight, and give the audience a better understanding of the morals and beliefs of a composer. Some of the most famous composers of the Requiem Mass are Mozart, Verdi, Brahms, Fauré, and Britten.

Through the comparison of textual and compositional choices, the religious and moral beliefs of these composers are brought to light. The presentation will illuminate the transformation from the structured Roman Catholic Latin approach to that of a more informal Requiem Mass as a style of composition.



JOHN FLEMING, '14

The Budgetary Reform and Control Act: An Interdisciplinary Critique of the Financial Crisis in the United States

Faculty Sponsor: Bindu Madhok
Majors: Political Science, Communication Studies
Hometown: Grosse Ile, Mich.

No matter one's political ideology, it is hard to deny that the United States of the early twenty-first century suffers from severe budget difficulties at the federal level. Centered on this topic of great discussion in the current American political climate, this thesis examines the historical causes of these difficulties, proposes a public policy solution designed to correct them, and provides an interdisciplinary justification for its implementation.

Supported by: Prentiss M. Brown Honors Program

STEPHEN FOSTER, '15

Facts, Misconceptions, and the Science of Psychology

Faculty Sponsor: Holger Elischberger
Majors: Psychological Science, Spanish
Hometown: Livonia, Mich.

A sizable body of literature suggests that students in introductory psychology courses commonly hold misconceptions about specific psychological research findings (e.g., "Mozart's music can increase intelligence"), which are notoriously resistant to change. A separate research literature has demonstrated that students vary in the extent to which they view psychology as a science. The current study explores the intersection between these two issues. Students enrolled in introductory psychology courses were asked to complete measures of (1) misconceptions about psychological research findings, the scientific method in general (e.g., "Science produces tentative conclusions that are open to change"), and everyday issues (e.g., "Antibiotics are effective treatment for the flu"); (2) a survey assessing their view of psychology as a science (PAS; Friedrich, 1996); (3) the Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984); and (4) their interest in the research and clinical aspects of psychology. We expect that students with a greater appreciation of psychology as a science will be less prone to hold misconceptions about psychological research findings and the general scientific method, but not about everyday issues. Moreover, we expect that many of the variables that have been shown to predict students' views of psychology as a science, such as need for cognition and an interest in the research aspect of the discipline, will also predict decreased belief in misconceptions about psychological research findings.



DANNIE LYNN FOUNTAIN-JAGODZINSKI, '14

Implications of Body Modifications on the Hiring Process

Faculty Sponsor: John Carlson
Major: Media and Marketing Management
Hometown: Lexington, Mich.

The purpose of this study is to understand the stereotyping that often occurs during the hiring process in relation to body modifications. The persons in question for this study are those who have in some form or matter permanently modified their body from its original state through the application of piercings, tattoos, scarification, or other forms of body art. The study is twofold—looking at the views and opinions of college-aged midwestern Americans and those of hiring managers. To examine the views of college-aged midwestern Americans, a study was conducted. Participants viewed two interviews of young men approximately their own age and made a hiring decision based on the video interviews and corresponding resumes as to which young man they would hire. To study the views of hiring managers, interviews were conducted asking a set series of questions to determine how a modified individual would be evaluated during the hiring process and if there would be any immediate issues for this person upon being hired, such as adherence to a stricter dress code.

DANNIE LYNN FOUNTAIN-JAGODZINSKI, '14

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—Sail-Connect)

JUSTIN FRAGNOLI, '14

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—Electronic Cigarette)

ZACHARY FRANCIS, '15

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—SLG 3D Printing)



Frick

ETHAN FRICK, '16

Majors: Mathematics, Biology
Hometown: Clarkston, Mich.

MICHAEL SEARS, '15

Majors: Biology, Spanish
Hometown: Dearborn, Mich.

Using Comparative Genomics Analysis to Study Heterochromatin of the Fourth or 'Dot' Chromosome from Two Species of *Drosophila*

Faculty Sponsor: Kenneth Saville

A genome is the complete DNA sequence of an organism. While obtaining the complete DNA sequence of an organism is important, it is not the only step to assemble and analyze the structure and function of particular genes. Through computer science and various databases we are able to more

fully understand these genomes and how they connect evolutionarily. We can also look at specific places within these enormous genomes in order to find exactly where these genes are located.

The Genomics Education Partnership (GEP) is a scientific investigation looking to create gene models for all genes in a genome, and more specifically, the genomes of several *Drosophila* species. This is accomplished by comparative analysis to the fourth chromosome, also known as the dot chromosome, of *Drosophila melanogaster*. The dot chromosome is made up of heterochromatin, which is a DNA-protein complex that stains with fluorescent dye, has a number of repetitious sequences, and is often not transcribed due to the tight packing that it retains during interphase. The distal areas of the dot chromosome also show characteristics of euchromatin. Using databases such as GEP, Blast, and Flybase, we annotated the 34th contiguous sequence of genes of *Drosophila biarmipes*. We estimated there would be five distinct genes in this sequence each with 2-7 variants. A detailed analysis of these genes will be presented.



Sears

**ALYSANDRA GANEM, '14**

Elton John Meets Aeronautics: Design and Construction of a Subsonic Rocket with Glider Recovery System

Faculty Sponsors: Nicolle Zellner, Aaron Miller

Major: Physics
Hometown: Dearborn, Mich.

Model rockets provide a very good way to apply many concepts in physics. Getting a rocket to fly is an easy task, but getting it to fly safely and in a controlled manner requires a solid understanding of mechanics and fluid dynamics. There are different ways to build a rocket, and this project involved designing and building a rocket with a glider recovery system. It is intended to fly up like a rocket and glide down like a glider. Previous studies have shown that rockets with slender designs can be easily modeled. However, to get a rocket to glide, wings, which disrupt the model, are needed.

In the design phase, Barrowman's equations governing rocket flight stability were modified and re-derived to account for the unusual geometry of this rocket. RockSim, a model rocket design software, supplemented with custom vPython code, was used to finalize the design of the rocket. During the construction phase, the rocket was built using a combination of standard model rocket parts and hand-crafted components. Results—and whether or not the rocket flew and landed successfully—will be discussed.

Supported by: FURSCA

PIETRO GEISLER, '16

Using Comparative Genomics Analysis to Study Heterochromatin from Two Species of *Drosophila*

Faculty Sponsor: Kenneth Saville

Major: Biology
Hometown: Grand Blanc, Mich.

The sequencing of genomes of numerous species has been an ongoing project for years. A number of different organisms have all had their genomes sequenced, including *Homo sapiens*. But while we have sequenced the genomes themselves, we do not fully understand all of the genes involved or their locations. Some organisms, such as *Drosophila melanogaster*, are very well understood, and we can compare lesser understood organisms to these in order to better understand them. In this project, the dot chromosomes from various species of the genus *Drosophila* are being compared to that of *melanogaster*'s. The dot chromosome is of particular interest as it is composed of heterochromatin, a highly condensed form of chromatin that is thought to have a role in the expression and/or repression of genes, and is an ideal area for study.



The project is headed by the Washington University of St. Louis in what is known as the Genomics Education Partnership. Through their resources, such as the Genome Mirror Browser, a Gene Model Checker, and a Gene Record Finder, we can compare and identify genes in various *Drosophila* species by comparing them to those of *D. melanogaster*. The particular portion of the chromosome studied here is that of *D. biarmipes*, along a site known as contig58. There are estimated to be five genes in this region, with one of them having possibly twelve different forms. A detailed analysis of these genes and their forms will be presented.

REBECCA GUNTZ, '14

Reflective-Based Teacher Evaluation: A Case Study

Faculty Sponsor: Nonye Alozie
Majors: Mathematics, Chemistry
Hometown: Coloma, Mich.

The state of Michigan currently evaluates teachers on student performance growth based on test scores and teacher practice. Based on research, a teacher's influence only makes up approximately 20% of the variation within student growth, while cultural factors make up the other 80% of the variation. This means that 40% of a teacher's evaluation is comprised of the cultural factors of their students within the classroom. My work researched a methodology for teacher evaluation that focused on one teacher's instruction. This methodology used an observation protocol to examine three elements of teaching: content, versatility, and classroom management. Furthermore, it incorporates the teacher into his or her own evaluation through a reflection dialogue that asked the teacher to examine the decision-making process within the three areas of observation focus. The intent was to change the purpose of evaluations from the measurement of teachers to the development of teachers. Through a case study with one teacher, three observations, and interviews, I found that the observation protocol allowed the teacher to identify her strengths and areas of development and the reflective conversation facilitated a feedback cycle that enhanced her decision-making process. I recommend that a combination of observations and structured goal-oriented conversations is a first step in promoting and supporting effective teaching practices.

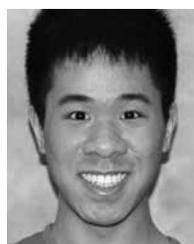


JESSICA GLAZIER, '15

Boys Don't Cry: Adult Perceptions of Children Who Defy Gender Roles

Faculty Sponsor: Holger Elischberger
Majors: Psychological Science, Music
Hometown: Troy, Mich.

The purpose of the current study was to investigate adult perceptions of gender atypicality in children, that is, children whose gender identity differs from their biological sex. News stories about gender variant children have increased in recent years, which frequently highlight a lack of understanding of gender nonconformity on the part of educators, school administrators, parents of the child's peers, etc. The current study was therefore designed to examine adult perceptions of gender atypical children. We used brief vignettes describing a gender atypical child and surveys to measure to what degree and for what reasons participants themselves, or society at large, may view gender atypicality as a problem, what they believe may be the cause(s) of gender atypicality, and whether and how gender atypicality might be modified. Given the findings of research on parents of gender nonconforming children, we predicted that participants would find gender variance more appropriate in girls than boys. In addition, although this issue has not been directly tested, some research suggests that gender atypicality may in part be viewed as problematic because of its potential link with homosexuality. Given that negative views about homosexuality increase with more traditional views on gender roles, we also examined how the participants' own adherence to conventional gender roles relates to their attitudes on gender atypical children. Finally, we predicted that atypicality would be viewed as a bigger problem in older (16 years) rather than younger children (8 years) because issues of sexuality become more prominent in adolescence.



Wu

REBECCA GUNTZ, '14

Majors: Mathematics, Chemistry
Hometown: Coloma, Mich.

BRIAN WU, '14

Majors: Mathematics, Music
Hometown: Troy, Mich.

Wheels: How to Divide by Zero

Faculty Sponsor: Mark Bollman

Over the years, mathematicians have changed the rules of mathematics in order to compute what was previously thought as impossible. In grade school, we initially learned that we could not take the square root of a negative number. Eventually, we learned about the set of complex numbers, which was invented in order to calculate all of the roots of any polynomial, including those involving square roots of negative numbers. Additionally, we learned that parallel lines never intersect. Upon looking at them from a new perspective, we learned that in projective geometry, parallel lines intersect at a point "at infinity." Recently,

mathematicians have changed the rules again. Division by zero was another forbidden operation; now mathematicians have defined two new numbers, $|$ and ∞ , that represent the two cases that arise when attempting to divide by zero. Adding these two numbers to the field of real numbers creates a new type of algebraic structure called a *wheel*. Our research focuses on the tradeoffs of changing the rules in this way, how basic arithmetic operations work within a wheel, and how polynomials with coefficients from a wheel look.

Rebecca Guntz was supported by: FURSCA—Bruce A., '53, and Peggy Sale Kresge, '53, Science Fellows

CHRISTINA HALLAM, '14

The Labyrinth: The Journey of a Pagan Symbol through Christianity

Faculty Sponsor: Ronney Mourad
Major: Religious Studies
Hometown: Overland Park, Kansas

The labyrinth is a pattern surrounded by much mystery, ambiguity, and misunderstanding. The path begins with Neolithic rock carvings in Europe with unknown origins. The pattern appears on ceramic vessels, clay tablets, and as graffiti on walls. Eventually, the labyrinth's legendary origins are recorded in the tale of Theseus and the Minotaur. Later, the labyrinth made its way onto the floors of cathedrals. After many waves of popularity, the labyrinth once again has found its popularity in Christian practice. More churches and individual persons than ever before have constructed them for public and personal use. However, with no mention of the meditative practice of walking the labyrinth in the foundational Christian texts in addition to its origins in pre-historical and pagan culture, many have questioned the labyrinth's place in Christianity. Others see the labyrinth as a new form for classical Christian mystical thought. This presentation will discuss the appropriateness of using the labyrinth as a tool for prayer and meditation in the Christian tradition. Guidelines for what qualifies as worship in a Christian setting will be given before a discussion of how the labyrinth interacts with those guidelines.

CHRISTINA HALLAM, '14

(See Peter Blair, '14, Tsiporah Davis, '14, Timothy Delong, '14, Christina Hallam, '14)



CAMILLE HASLINGER, '14

Should You Always Think Before You Speak? The Relationship between Social Anxiety and Speech Production

Faculty Sponsor: Andrea Francis
Major: Psychological Science
Hometown: Grand Rapids, Mich.

Why do some people produce more speech errors than others when giving a speech? Public speaking is one of the most feared forms of communication. Some people fear public speaking because they fear being judged by others; these people experience social anxiety (Schienecker & Leary, 1982). Nitschke and colleagues (2001) suggest that anxiety symptoms are comprised of anxious arousal and anxious apprehension. Anxious arousal involves physiological changes (increased heart rate) whereas anxious apprehension involves cognitive rumination and worry. Voncken and Bogels (2008) found that people with social anxiety disorder make more speech errors, like saying "uh" and "um," during conversations than those without the disorder. This study assesses the relationship between production of speech errors and social anxiety in college students.

In this study, participants completed a Communication Apprehension survey (arousal) and a Fear of Negative Evaluation survey (apprehension). To invoke public speaking anxiety, half the participants were told they would be evaluated (evaluation group). Participants were recorded while telling a story. The total of speech errors produced was divided by the total of words produced to get a disfluency production rate.

Results suggest that as social anxiety increases, particularly arousal, the disfluency production rate also increases, but only for participants who were not told they would be evaluated. The evaluation seemed to act as a distraction for the participants with high social anxiety, allowing them to produce more fluent speech. The results of this study suggest that, when treating individuals with speech difficulties, perhaps finding the right distraction may decrease speech errors.

MITCHELL HEHL, '15

Summer 2013: My Internship with D.C. Cook Nuclear Power Plant

Faculty Sponsor: Charles Moreau
Major: Physics
Hometown: Bridgman, Mich.

In the summer of 2013 I acquired a position in D.C. Cook's engineering internship co-op. They placed me with the Fukushima Emergency Response Team. This team is in charge of responding to the watchdog group from the Nuclear Regulatory Commission (NRC) and the NEI (National Energy Institute). The Fukushima team has to make decisions on modifications to the plant under all types of scenarios, from floods to earthquakes to tornados, and how to keep the plant



safe in the case of extended offsite power outages. They create a site specific plan called the FLEX program.

My supervisor, Cliff Harris, traveled all over the country to visit other plants and to collaborate on how some plants are solving the problems imposed on us by the NRC. I worked with every aspect of the team's work. I sat in on conference calls with AREVA (a contractor); on these calls we discussed things ranging from ventilation paths for the reactor core to where to keep and store emergency equipment. We studied building design and had to comply with other NRC rules regarding location, size, and number of plants. I was assigned to classify and create preventive maintenance logs for each piece of equipment. At the end of the internship I led my own walk-down of the plant with a survey group that was to take elevation recordings for flood analysis. Finally, I had to submit all of the paper work, and my name is now on an official legal document to the NRC.

We recognized four morphologic features in the study area: cones with complete or partial crater rims, remnant crater rims, breaches in crater rims, and lava outflow channels. The study area includes three cinder/spatter cones: Crescent, Miter, and Pocket. Crescent includes a large partial crater rim that encompasses the smaller Miter and Pocket cones. Miter is a well-developed cone, with a 200-meter diameter circular crater rim, while Pocket is the smallest and youngest cone, with a 100-meter diameter crater rim. Outcrops were correlated based on field characteristics and associations, including outcrop geometry, bomb and bed orientations, and lithofacies. Based on this we hypothesized a sequence of eruptive events.

Thin section and XRF geochemical analyses indicate that there were higher percentages of SiO₂ in the beginning stages of Miter Crater, suggesting that the lavas have undergone assimilation with the continental wall rock. Also, due to the younger Miter outflow channels containing higher percentages of olivine than the older Crescent and Miter dissected crater rims, we infer that fractional crystallization of magma was also a dominant process during magma genesis.

Supported by: FURSCA, Lawrence D. Taylor Undergraduate Geology Research Fund, Herbert H. and Grace A. Dow Professorship in the Sciences, Albion College Geology Alumni Fund



CHRISTOPHER HERWEYER, '17

A Presidential Home: A History of 501 E. Michigan Avenue

Faculty Sponsor: Marcy Sacks
Majors: Political Science, History
Hometown: Wyoming, Mich.

This project explores the history of the house located at 501 E. Michigan Avenue in Albion. Built over 100 years ago by a local business magnate, the house became the property of Albion College in 1941. Serving first as the home to a number of college presidents, it later became the Office of Institutional Advancement. Most recently, it has been utilized as a student annex. In exploring these transitions from private home to institutional property, my research highlights the impact that a building can have on a community and a college and on connecting the two.

Supported by: Student Research Partners

BENJAMIN HINKS, '14

Combining Google Earth Street View and Photography

Faculty Sponsor: Ashley Feagin
Major: Geology
Hometown: Grand Haven, Mich.

Throughout my Albion career I have always been told the benefits of being part of a liberal arts college. I realized that in order to truly embrace the liberal arts mentality you must immerse yourself in other forms of work. While taking Photography 241 I was tasked with combining my love for geology and the artful world of photography. To do this I used a combination of Google Street View and photos I created in order to give them a scientific feel. Google Earth and Street View are tools that allow the user to view certain locations from a computer. For my project I would choose a certain locality that I wanted to photograph, print a Google Street View screenshot of that area and then go to that location in real life. Here I would hold the image up next to the scenery and take photos of the real life as well as the printed image simultaneously.

My interest in this project comes from my love of science and in particular geology. It readily combines technology, science, and art in order to produce photographs. In the sciences Google Earth is a very useful tool for mapping, and I used it extensively for mapping my research location in the Black Rock Desert, Utah, while studying volcanoes. It allows the user to see and work with a perspective that would not otherwise



BENJAMIN HINKS, '14

Reconstruction of Eruptive Sequences of Cinder and Spatter Cones in the Ice Springs Volcanic Field of the Black Rock Desert, Utah

Faculty Sponsor: Thomas Wilch
Major: Geology
Hometown: Grand Haven, Mich.

The ~20 km² Ice Springs Volcanic Field in south-central Utah comprises at least four centrally located basaltic cinder/spatter cones surrounded by lava flows. The field is located near the eastern edge of the Basin and Range Province and contains the youngest known volcanoes in Utah (~660 years old). The main goal of this project is to map and geochemically characterize outcrops within the nested cones in order to establish an eruption sequence.

be seen. With this project I hope to bring light to the scientific section of photography and the usefulness of having a liberal arts college background.

GEOFFREY HISSOM, '14

GEP Gene Annotation of *D. biarmipes* Dot Chromosome, Contig43

Faculty Sponsor: Kenneth Saville
Major: Biology
Hometown: Spring Lake, Mich.

The Genomics Education Partnership (GEP) is a national, collaborative, scientific investigation of a problem in genomics. It involves the use of wet-lab generations of large data sets and computer analysis of the collected data. Annotation of such gene data is especially pertinent to the creation and description of working gene models for all the genes in a genome. The specific goal of this project is to annotate the genomes of several *Drosophila* species, utilizing the well-known genome of *D. melanogaster* as a reference genome. The particular focus of the GEP rests on genomic regions in other species that correspond to chromosome four of *D. melanogaster*. This project considers the *D. biarmipes* dot gene, more specifically, the forty-third contig's gene annotation. There are five probable genes identified in this region of the *D. biarmipes* genome, and they are as follows: bt-(PH, PI, PC, PF), Strn-Mlck-(PN, PG), CaMKI-(PG, PI, PB, PA, PH), sqa-PB, and med26-(PA, PB). Through annotation the most probable genes can be determined from the orthologs of *D. melanogaster* and allow for a better understanding of evolutionary processes, gene regulation, assessments of repetition, and other genomically relevant information.

DAVID HUGGINS, '14

Constraining Extent of Metasomatism with Oxygen Isotope Geochemistry of Zircons from UHP Orthogneiss, North Qaidam, China

Faculty Sponsor: Carrie Menold
Major: Geology
Hometown: Grand Rapids, Mich.

The Luliang Shan locality of North Qaidam UHP terrane, China, contains an eclogite rock unit in a host granitic gneiss. Previous work on this unit identified a hydrated zone in the gneiss surrounding the eclogite blocks. Whole rock geochemistry, loss on ignition data, and petrologic analysis have led to the interpretation that metamorphic fluids caused the selvage. In order to prove the existence and understand the nature of these fluids, Menold et al., (*in review*) collected samples along a traverse between the eclogite and the gneiss. Oxygen isotope analyses of metamorphic quartz and mica in the gneiss were found to be heavier than typical granite levels (~12-16‰). In order to determine if externally-derived

fluids caused the heavy isotope signature, it became important to determine the original igneous oxygen composition. Because oxygen diffusivity is generally sluggish in zircon at 600°C metamorphic conditions, zircon should retain the igneous oxygen isotopic composition. Zircon was extracted from four samples in the gneiss, both in and outside of the selvage zone. Cathodeluminescence imaging of sectioned and polished zircon revealed oscillatory zoning within grain interiors surrounded by homogenous overgrowths. The UCLA ims1270 ion microprobe was used to measure O isotopes in the zircons. The $\delta^{18}\text{O}$ of the igneous zircon from the granite gneiss several meters from the selvage yielded 5-7‰ oxygen isotope values. These results are consistent with a whole rock composition of ~6-8 ‰ for the granitic protolith of gneiss and indicate that it was significantly enriched in ^{18}O during UHP metamorphism. We hypothesize that an externally derived, high $\delta^{18}\text{O}$ fluid infiltrated the granite gneiss to produce the hydrous selvages observed mantling eclogite.

Supported by: FURSCA



JALYN INGALLS, '14

Leadership Development in 5th and 6th Graders

Faculty Sponsors: Heather Betz, Tammy Jechura, Vicki Baker
Major: Health Policy
Hometown: Ellsworth, Mich.

Leadership skills are highly valued in our society. Although leadership can take many forms, improving leadership skills could be an important step for students as they learn to navigate the world and work toward future success. There are numerous opportunities for students to develop leadership abilities in their interest areas. Developing skills that empower individuals is an important part of developing self-esteem and becoming a confident young person. A study by Barr-Anderson, Laska, Veblen-Mortenson, Farbaksh, Dudovitz and Story (2012) examined an intervention program designed to increase physical activity for 6th graders that consisted of participation in 25 minutes of physical activity with exercise-based DVDs, peer-led classroom sessions, and healthy eating homework activity sheets. Peer leaders understand the current social environment, so they can adjust the information they provide to help start positive behaviors. The study found a significant increase in time spent in physical activity outside of school and more awareness of health behaviors.

The current study examines the use of a school leadership program and the ability of a group of children to learn leadership skills, and develop these skills through physical activity time with their classmates. Participating students were tested for their self-assessed leadership skills before and after the program with three questionnaires that asked the students to rank



themselves on leadership qualities, compare their skills to others' skills, and identify situations in which they might take a leadership role. Children in the leadership skills program showed a significant increase in their perceived leadership abilities.



Ishmon

ATRAEYU ISHMON, '14

Major: Biology
Hometown: Milan, Mich.

JOE SILVESTRI, '15

Major: Biology
Hometown: Novi, Mich.



Silvestri

Comparative Genomic Analysis of a Region (Contig51) of the Fourth Chromosome from Two Species of *Drosophila*

Faculty Sponsor: Kenneth Saville

Analysis of structure and function of genomes, which are the DNA sequences of organisms, is accomplished via DNA sequencing. The comparison of similar genomic sequences allows us to view patterns which may further our understanding of conserved features between species. In this case,

we are interested in comparing the condensed heterochromatin of two species to examine gene expression.

We will be analyzing *Drosophila biarmipes* genome contig51 in reference to the fourth (dot) chromosome of *Drosophila melanogaster* in order to annotate a specific portion and locate specific protein expression. Comparative analysis of the fourth chromosome from these species will give us an idea of what to expect from the genomic structure of the sequence to be annotated. We will discern patterns of genomic organization related to the control of gene expression between the species.

The approach we are taking involves the extensive use of the Genomics Education Partnership, specifically in tandem with the UCSC Genome Browser as well as the use of BLAST (the Basic Local Alignment Search Tool) to examine this contiguous sequence containing the genes of interest. A Gene Record Finder tool will be used to gain more in-depth information about the specific gene to be annotated. The Gene Model Checker tool is going to be used to show how likely it is that our estimates are correct in the evaluation of this sequence. A detailed analysis of the genes we are studying will be presented, aiding the completion of the full genomic map of *Drosophila biarmipes*.



SARA JONGEWARD, '14

Exploring the Graphic Novel as an Artistic and Narrative Medium

Faculty Sponsor: Helena Mesa
Majors: Art, English (Creative Writing)
Hometown: Rochester, Mich.

The term 'graphic novel' doesn't necessarily elicit associations with fine art or literature; rather, it's more common to think of the colorful, explosive panels of superhero comics, cartoonish and lighthearted stories like Scott Pilgrim, or the exaggerated, fantastical, and grandiose narratives of Japanese manga. But the form is changing; in the last two decades, the novels and works of artists such as Chris Ware, Alison Bechdel, and Daniel Clowes challenge these associations, pushing the medium from the fantastical to the mundane, from the escapist to the realistic, from the entertaining to the philosophical, in both content and art. Using these artists and many others as models, I used my talents as an artist, poet, and journalist to create a process of artmaking and storytelling in the style of the graphic novel. Based loosely on Leo Tolstoy's opus *Anna Karenina*, my graphic novel, *As If She Were the Sun*, tells the story of three college students seeking to forge identities for themselves at the fictitious Climax College as they struggle with burgeoning sexuality, social and familial expectations, tragedy and despair, group identity and the onset of adulthood.

Supported by: FURSCA—James W. Hyde Endowed Student Research Fellowship



WALTER KACHER, III, '14

How Hip-Hop Is Reviving Detroit

Faculty Sponsor: Lynn Verduzco-Baker
Major: English
Hometown: Grosse Ile, Mich.

This project investigated the hip-hop scene in Detroit, Michigan. Detroit is famous for its movements, whether industrial, political, or artistic. With regard to the latter, Detroit has ushered in many musical eras, including the Motown sound of the 1960s, and now, while Detroit struggles through near economic collapse, young artists from Detroit create a different kind of music unique to their environment: hip-hop. I studied how hip-hop artists in the Detroit area understand their role within their city and the hip-hop world. In particular, I asked hip-hop artists how they understand their potential to rejuvenate Detroit as their own artistic hotspot and how they believe Detroit as an environment may be shaping their art. No one has carefully examined these artists before. I met over a dozen of them—including rappers, producers, photographers, and painters—observed them in their studios, and interviewed them. I discovered that while these artists do realize the

potential in Detroit's future, they use their art as an escape from the harsh realities of the city. Most artists did not use Detroit as an influence in their art but instead chose to make their art a separate world. At the same time, they worked together to make Detroit a tightly knit art scene that could inspire future generations.

Supported by: FURSCA

HEIDI KELLER, '14

The Relationship between Groundwater Seepage and Nitrate Concentrations in the Kalamazoo River, Michigan

Faculty Sponsor: Timothy Lincoln
Majors: Geology, English
Hometown: Bryan, Ohio

This research investigated the relationship between seepage rates and nitrate concentrations in the Kalamazoo River. This river is a low-profile, gaining, meandering stream with an adjacent wetland corridor and underlying glacial sediments. Water enters the stream in various ways. One is through springs with focused flow, marked by sand boils. The largest spring we measured had an average flow rate of $6.00 \times 10^{-3} \text{ m}^3/\text{sec}$. Water also enters the river through diffuse flow through normal river sediment, but at variable rates. Detailed stream bed temperature maps reflect the rate of flow. Localized cold spots with temperatures up to 8°C lower than river water, and ranging from 1.0 m^2 to less than a 0.2 m^2 in size were discovered, and had seepage rates of $3.9 \times 10^{-4} \text{ cm/sec}$ compared to $3.2 \times 10^{-6} \text{ cm/sec}$ in a warm area. The 100 times greater seepage rate in the cold area indicates the stream is fed disproportionately by small areas of high flow.

The Kalamazoo River has nitrate levels of 2-6 mg/L. In contrast, springs and most areas of high diffuse flow contain relatively high nitrate, 11-30 mg/L. Pore waters in areas of low diffuse flow and surface runoff from adjacent wetlands have lower than 1 mg/L, nitrate levels. The upper portion of the water table aquifer is reported to be contaminated with nitrate. Where this water passes through organic-rich sediments, nitrate is reduced and removed. In areas of focused flow, the nitrate is not reduced and is carried into the stream. A simple mass balance calculation suggests that at least a quarter of the base flow in the river bypasses the reducing sediment.

Supported by: FURSCA—Vernon Lawson Research Endowment

CHRISTINA KHIM, '14

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—Electronic Cigarette)



RACHEL KOHANOV, '14

Nestling Responses to Alarm and Food Calls of Adult House Wrens (*Troglodytes aedon*)

Faculty Sponsors: E. Dale Kennedy, Douglas White
Major: Biology
Hometown: Port Huron, Mich.

House wrens (*Troglodytes aedon*) are small, migratory birds that will readily build nests in boxes. Two kinds of parental vocalizations may influence behavior of young birds in the nest. Begging solicitation, or food calls, by adults can trigger begging by nestlings. Alarm calls by adults can silence nestlings for protection against predators. Lock and Hauber (2012) suggested that there are pitch differences between food and alarm calls, and that young birds may be restricted in their range of hearing and able to hear only one type of call at hatching. Because cavity-nesting birds face less threat from predation than do open-nesting birds, nestlings in cavities should exhibit sensitivity to food calls earlier than to alarm calls. Young nestling house wrens (age day 1-3) do respond to adult food calls (Mapes 2012).

In 2013, I studied house wrens in Whitehouse Nature Center and tested the hypothesis that nestlings will show an early sensitivity to food calls and will respond appropriately to alarm calls later in development. I elicited alarm calls of parent birds and, by means of a small infrared camera placed inside nest boxes, I recorded nestlings' responses to alarm calls at early and late stages of development. I collected data on nestling responses through analysis of video playback. Preliminary results suggest that older nestlings were more silent in response to alarm calls than were young nestlings.

Supported by: FURSCA—Robson Family Fellowship



ZACH KRIBS, '15

Evidence-Based Treatment in a Clinical Setting

Faculty Sponsor: Barbara Keyes
Majors: Psychological Science, Music
Hometown: Mason, Mich.

In clinical practice, there has been growing interest and awareness around the use of psychological therapy that is grounded in empirical evidence. This therapy, also known as evidence-based treatment (EBT), is defined by an approach that emphasizes the pursuit of evidence in both theory and technique, and the use of theories and practices that have been demonstrated to be effective by research. Such methods have been proven more effective than other counseling therapies, such as intuition. One of the largest institutional proponents of EBT is the U.S. Department of Veterans Affairs. Since 2011, five



Albion students have completed research internships with the residential Post Traumatic Stress Disorder (PTSD) program at the Battle Creek VA Hospital. EBT has been seen to be especially important in the context of PTSD, as the disorder is often comorbid with substance use disorders and other emotional issues that inhibit the effectiveness of therapy. Albion students have been involved in evaluating therapeutic interventions for residential patients, especially in the assessment of the effectiveness of EBT such as cognitive processing therapy and exposure therapy. Albion's interns have had direct exposure to EBT research and implementation, building a large database of psychometric evaluations of patient responses to EBTs, as well as observing these therapies in practice. These students have been a crucial part of how the hospital fulfills its commitment to EBT, providing both real-time evaluations of patient progress, as well as the effectiveness of EBT when applied in a clinical context.



SHANTI MADHAVAN, '15

Music: A Vessel for Learning English as a Second Language

Faculty Sponsor: Kyle Shanton
Major: Psychological Science
Hometown: Onsted, Mich.

In May 2013 I traveled to Costa Rica with two other students in Albion's teacher education program and our professor, Dr. Kyle Shanton. The purpose of the trip was to become acquainted with Costa Rican culture and school structure. We spent a month in Heredia, observing and teaching at Par  School, a small primary school, and interacting with students and faculty at Universidad Nacional de Costa Rica. With the help of our Costa Rican hosts we had a true immersion experience. Another goal of the trip was to complete an inquiry project pertaining to teaching English as a second language at Par  School. I was primarily interested in how music was used in Costa Rican classrooms to help the students learn English. Through classroom observations, interviews with teachers, and introducing some musical activities to first graders I saw how music supported and encouraged Costa Rican students' English development. Music not only made learning fun but it also comforted students' fear of practicing a second language. This is yet another example of how education is not only a science but a culturally situated art-form.



ADAM KUDIRKA, '15

Investigation of the Inhibition of Angiogenesis by sJAM-B via the Src Kinase

Faculty Sponsor: Bradley Rabquer
Major: Biology
Hometown: Milford, Mich.

Angiogenesis is the formation of new blood vessels from pre-existing ones. It is involved in many physiological and pathological processes. Angiogenesis is regulated in our bodies by molecular factors that either stimulate the formation of new blood vessels or inhibit the formation of new blood vessels. Junctional adhesion molecules (JAMs) are a family of molecules found inside the body that play a role in regulating angiogenesis.

The hypothesis was that sJAM-B inhibits vascular endothelial growth factor (VEGF) by reducing angiogenesis via the src kinase. To test our hypothesis the following methods were performed: in vitro assays of human vascular endothelial cells, chemotaxis assays, and western blotting. Due to cell contamination by bacteria and technical issues involving western blotting, inconclusive results were obtained. Future implications of this research would involve revisiting these methods at another point in time and replicating these methods.

Supported by: FURSCA



DEBVARSHA MANDAL, '14

The Roles of *nina* and *norpA* Genes in Conducting Photo-Transduction in *Drosophila melanogaster*

Faculty Sponsor: Roger Albertson
Major: Biology
Hometown: Kuala Lumpur, Malaysia

The common fruit fly, *Drosophila melanogaster*, exhibits a variety of complex behaviors including responses to gravity (geotaxis), light (phototaxis), and taste (gustation). *Drosophila* shows a positive phototactic response which is dependent on three components: (a) ability to detect light, (b) the cellular transduction of light stimulus, and (c) motor output. Visual photo-transduction within rod, cone, and photosensitive ganglion cells converts light into electrical signals essential for motor output. The aim of this research is to identify the underlying genetic basis of eye development and photo-transduction. Previous research has shown that *ninaA* and *norpA* genes play an important role in the photoreceptor cells within the visual signalling pathway of the *Drosophila* compound eye. Mutations in *ninaA* cause mislocalization of rhodopsin pigment, while mutations in *norpA* cause retinal degeneration and photo-transduction defects. To test if *ninaA* and *norpA* cooperate in a common pathway to promote photo-transduction and eye

JONATHAN LIST, '14

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—SLG 3D Printing)

morphology, we examined double heterozygotes with reduced levels of *ninaA* and *norpA*. Secondly, we tested if the role of *norpA* is dosage-sensitive by overexpressing *norpA* in the eye using the GAL4/UAS system. The data indicate that the *ninaA/norpA* double heterozygote shows normal eye morphology, yet show a mild phototactic phenotype suggesting that these two genes work in a common pathway for phototransduction. Overexpression of *norpA* caused eye morphology and phototactic defects indicating the role of *norpA* in these processes is dosage-sensitive.

showed significant differences among property (SEV) values ($F=64.30$, $P=2E-139$, $df=12$) in economic neighborhoods. A simple regression analysis showed no linear relationship among economic neighborhood and tree diversity (Shannon-Weiner Index, $R=0.04$) or tree condition (scored 0-5, $R=0.07$). Therefore, my hypothesis was rejected. A total of 79 species were documented, 33 (42%) of which are native. The most important trees were sugar maple ($n=715$, $IV=51.5$), Norway maple ($n=657$, $IV=41.5$), honey locust ($n=385$, $IV=30$), silver maple ($n=358$, $IV=24.2$), and red maple ($n=251$, $IV=15.8$). The information from this survey may prove useful to the City of Albion in future tree planting and maintenance.

Supported by: FURSCA



JACK MANQUEN, '15

Host-Microbe Interaction in *Drosophila* and *Wolbachia*

Faculty Sponsor: Roger Albertson
Major: Biology
Hometown: Shelby Township, Mich.

Wolbachia is one of the most common parasitic bacteria; it infects various arthropods, including insects such as *Drosophila*. Within *Drosophila*, different *Wolbachia* strains exhibit a variety of phenotypes. While some of these phenotypes have been determined, little is known about whether they are caused by the host (*Drosophila*) or the microbe (*Wolbachia*). The goal of this project is to transfer various *Wolbachia* strains between different *Drosophila* lines in order to determine whether the phenotypes are due to the host or the microbe. The results of this project will lead to a better understanding of this host-microbe interaction and help develop better strategies in combating illnesses such as river blindness and dengue fever.

Supported by: FURSCA



CARLOS MATTI, '14

Nanoscale Palladium Catalysis on Charcoal and Diatomaceous Earth

Faculty Sponsor: Kevin Metz
Major: Chemistry
Hometown: Clinton Township, Mich.

Nanoscale metals offer increased surface area-to-volume ratios in comparison to their bulk counterparts. Thus, transitions toward nanoscale catalysts can reduce industrial and manufacturing costs substantially. One limitation of nanoscale catalysts, however, is the difficulty of removal from the reaction mixture. By anchoring a nanoscale catalyst to a microscopic substrate, microfiltration can separate the catalyst from the reaction mixture; thus, this limitation can be overcome. Here, we present the results of our investigations in the synthesis of palladium nanoparticles on varied substrates for catalysis. Our synthetic approach is facile, occurs at room temperature, and utilizes a mild reductant—coffee. Further, it results in the palladium nanoparticles being successfully anchored directly to substrates. We investigated activated charcoal and diatomaceous earth as substrates, using the hydrogenation of methyl-trans-cinnamate to compare the efficacy of our substrates to the literature.

Supported by: FURSCA



LUCAS MARTIN, '14

A Survey of Parkage Trees in Albion, Michigan Economic Neighborhoods and Public Housing

Faculty Sponsor: Dan Skean
Major: Biology
Hometown: McHenry, Ill.

In summer 2013, I continued work started by Heather Nobert in summer 2011 by completing an inventory of all city-owned trees of Albion in the parkage (tree lawns between sidewalk and street curb). I collected data on species, size, condition, and geographic location using GPS, for 1,263 trees, for a total of 3,340 trees since the project began. These trees were mapped using ArcGIS 10.1 software and assigned to one of 13 economic neighborhoods as defined by the city assessor or one public housing unit. I hypothesized that neighborhood property value is positively correlated with greater species diversity and tree condition. A 1-way ANOVA



ALLISON MCCLISH, '15

Cytoplasmic Incompatibility and Infection Frequency of *Wolbachia* in a Michigan Population of *Drosophila melanogaster*

Faculty Sponsor: Roger Albertson
Major: Biology
Hometown: Bronson, Mich.

In some species of *Drosophila*, *Wolbachia* infection results in an effect known as cytoplasmic incompatibility (CI). This effect inhibits the viability of offspring produced from the mating between an



uninfected female fly and an infected fly. Because *Wolbachia* is transferred through the mother to the offspring, this effect gives a reproductive advantage to those females that are infected, thus raising the infection frequencies of the population. In *D. melanogaster*, this effect has been found to be minor or non-existent, and in general this species has a lower infection frequency than *D. simulans*, which has been found to evidence a very strong CI effect. In a study of a Michigan population of *D. melanogaster* in 2012, a very high infection frequency was found. In order to explain this high frequency, this population was tested for CI. Three different sets of flies were tested, including originally wild-caught stocks that had been in the lab for several months, freshly caught flies, and the first-generation offspring of wild-caught flies. In these tests, infected males were crossed to uninfected females and the percentage of eggs hatched calculated. Though initial crosses using the lab stocks showed a potential CI effect, further crosses evidenced very little or no CI effect for this population of *D. melanogaster*.

Supported by: FURSCA

CAITLIN MCCLOREY, '15

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—FullFit)

BRAD MELPOLDER, '14

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—FullFit)

ROSS MUNIGA, '15

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—SLG 3D Printing)

DANIEL MYCKOWIAK, '14

Civic Disengagement and Socioeconomic Inequality: The Role of Labor Unions in Michigan

Faculty Sponsor: Dyron Dabney
Major: Political Science
Hometown: Detroit, Mich.

Michigan has traditionally been a stronghold for labor unions. As a result, for many years the state enjoyed high levels of civic participation, and was home to a robust middle-class. In recent decades, much of this has changed. Unions have experienced a dramatic decline in their membership and influence, both nationally and in Michigan. As union membership, popularity, and presence have declined, so too has the state's middle-class population. Moreover, civic

disengagement in Michigan is at an all-time high. This paper explores the relationship among the decline in labor unions, socioeconomic status, and civic engagement in historically union-dominant cities in the state of Michigan. Additionally, the paper examines the consequences of the decline in labor unions on civic engagement.



EVAN NEW, '14

Invertebrate Paleontology of the Late Mississippian Bayport Limestone, Bellevue, Michigan

Faculty Sponsor: William Bartels
Major: Geology
Hometown: Evanston, Ill.

This study describes a moderately diverse fossil marine invertebrate fauna from the Mississippian Period (330 million years ago) of Michigan which was then near the equator and covered by a shallow seaway.

The fossils are from the Bayport Formation and were collected from the Cheney Limestone Company's quarries in Bellevue, Michigan. The exposure of the Bayport there is 20 meters of light yellow to grey limestone which has been quarried for cement for over 100 years. Despite this long history, the fossils from this deposit have never been fully studied or described. This fauna includes: diverse bryozoans (moss animals) including species of *Monticulipora*, *Cosinium*, *Fenestella*, and *Polypora*; bivalves (the clams *Allorisma* and *Wilkingia*); three corals (the horn coral *Zaphrentis*, the colonial rugose coral *Lithostrotion*, and the tabulate coral *Syringopora*); an indeterminate crinoid (sea lily); a nautiloid (*Vestinautilus*); and a trilobite (*Palladin chesterensis*). In addition, several brachiopod species including *Anthracospirifer* have recently been recovered from a transitional zone with the underlying Michigan Formation.

The precise age of the Bayport Formation has not been determined, but the presence of *Palladin chesterensis*, *Anthracospirifer*, and *Zaphrentis* indicate a Chesterian rather than Meramecian age for the deposit. The Bayport fauna preserved in Bellevue differs from that of the type section in the Alpena area where sandstone, shales, and dolostones are interbedded with the limestone. These faunal differences may reflect the more open and clearer ocean water present in the central part of the Michigan basin during the Mississippian.

Supported by: FURSCA, Lawrence D. Taylor Undergraduate Geology Research Fund, GLCA NDI Grant



TIFFANY NEWSOM, '14

To Poland and Back: Reflections on the Holocaust

Faculty Sponsors: Jocelyn McWhirter,
Frank Kelemen
Major: Religious Studies
Hometown: Pewamo, Mich.

My interest in the Holocaust Studies Service Learning Project (HSSLP) began with the question posed to Elie Wiesel as a young man in the concentration camps. While the prisoners were forced to witness the hanging of a young boy, Wiesel heard a man asking, "For God's sake, where is God?" I went to Poland searching for an answer to this question; that is, to engage in theodicy. Where was God? How could an all-good, all-knowing, all-powerful God let such atrocities as the Holocaust happen? I developed several answers to these questions while in Wroclaw, Poland as a result of our service-learning work. Service learning is comprised of three main components: (1) classroom learning, (2) a service activity which is informed by the classroom learning and (3) reflection on the service activity and the classroom learning. As a culmination of our classroom learning, centered on the historical context of Judaism in Poland and Nazi Germany, we traveled to Wroclaw, Poland where we worked to restore the New Jewish Cemetery which was decimated and abandoned after World War II. To conclude this service-learning project I am going to share some of my reflections on how these experiences have informed my understanding of theodicy.

Supported by: Holocaust Studies Service Learning Project



STUART NOLTON, '14

A Discussion on Mozart's Piano Concerto No. 12 in A Major K.414

Faculty Sponsor: James Ball
Majors: Music, Physics
Hometown: Grosse Pointe Woods, Mich.

Mozart speaks through his music, but without historical and stylistic context, Mozart's message runs the risk of being misunderstood. In my presentation I will elaborate on the musical style in Mozart's time and explain how understanding the era can lead to a more accurate performance, in a historical context. There is a reason Mozart is still remembered today, and as you will hear, it is the subtle things that make Mozart's music great. Music can be compared to speech in many ways. When physically writing a sentence, it is uncommon to notate the phrasings and inflections one is to make when speaking said sentence. This is because speech is very natural to us. With music notation, more information is given to the reader on

the written page, but without proper historical and musical context, Mozart's music could be "misspoken" or "mispronounced." I will explain how I used this background to help me better learn the Mozart Concerto No.12 in A Major.

MACKENZIE NOVAK, '15

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—Innov/Screens)



ELIZABETH NYKAMP, '14

Jane Austen and Anglicanism

Faculty Sponsor: Sally Jordan
Majors: English, Religious Studies
Hometown: South Lyon, Mich.

Jane Austen was raised as a devout Anglican and carried these beliefs throughout her life and into her writing, even though many critics do not focus on the pervasiveness of her religion's influence on her novels. Through a close analysis of all six of Austen's completed novels, a consideration of the doctrines of eighteenth- and early-nineteenth-century Anglicanism, and a study of critical work by Austen scholars, I investigate how her Anglicanism influenced her novels.

I address Austen's possible struggling with her own, sometimes malicious, wit against her Anglican morality and Christian exhortation to kindness, especially with *Mansfield Park* being considered so dreary by many scholars and general readers in comparison to her earlier work *Pride and Prejudice*. I also concentrate on an idea that Austen most notably foregrounds in *Sense and Sensibility*, that the right or wrong marriage partner can seriously affect the other's spiritual wellbeing. The last two chapters deal with moral authority, both of the principal characters and of the clergy, and how Austen is able to mock members of the clergy, yet still be a devout Anglican.

Putting Austen's novels in their Anglican context can explain several points that tend to confuse modern readers, such as why Sunday travelling is such a weighty problem or why Emma's joke about Miss Bates prompts such a stern reprimand from Mr. Knightley. Though Austen was not overt about her Anglicanism in her novels, the way she presents her attitudes toward wit, moral authority, and marriage reflects a devout belief.

Supported by: FURSCA



HANNAH PANKRATZ, '14
Using Remote Sensing and Field Spectrometry to Discriminate Maize and Soybeans for Cropland Mapping Applications

Faculty Sponsor: Michael McRivette
 Major: Geology
 Hometown: Bad Axe, Mich.

Food security is a burgeoning concern globally as population, particularly in developing nations, is projected to continue growing over the next several decades. The resulting increased food demand may be further exacerbated by impacts of global climate change on the world's agriculturally-productive regions. To meet these challenges, cropland maps that can be compiled with high accuracy at low cost are essential to estimate agricultural acreage and production, characterize changes over time, and aid agricultural policy decision-makers. Accurate cropland maps are typically produced by combining remote sensing imagery with extensive, costly, and time-consuming field surveys. In this study, the use of field reflectance data as reference data for the automatic mapping of these crops in freely-available satellite imagery was evaluated as a potential solution to the need for cropland maps. Measurements of canopy-level reflectance of corn and soybeans were collected from fields located south of Marshall, Michigan throughout the 2013 growing season using a field spectroradiometer. The field reflectance data were combined into a reference "library" against which a hyperspectral satellite image of the region acquired in 2011 was compared to produce maps of corn and soybean fields using various methods. The resulting maps were assessed for accuracy by comparison with the corresponding portion of the 2011 U.S. Department of Agriculture Cropland Data Layer. Preliminary results indicate that this methodology holds some potential for accurate, low-cost cropland mapping.

Supported by: FURSCA—Vernon Lawson Research Endowment



HOLLY PAXTON, '14
Spacing Effect in Escape and Punishment Learning of Earthworms

Faculty Sponsor: W. Jeffrey Wilson
 Major: Psychological Science
 Hometown: Flint, Mich.

Many invertebrates are capable of learning and have nervous systems comparable to those of more complex mammals. A specific type of learning that is often explored is instrumental conditioning, which involves learning about the consequences of a response. Instrumental conditioning was first explored in earthworms as early as 1912 with Yerkes' study on T-maze learning. Instrumental conditioning has also

been found in simple systems such as the spinal cord of rats (Grau, 1998).

Much research has explored a spacing effect in humans that suggests that learning which is spread out over time (spaced) is more beneficial than learning that is crammed (massed). The current study aimed to create a model of instrumental conditioning in earthworms, *Lumbricus terrestris*, in the form of escape and punishment learning and to explore the impact of the spacing effect. Worms were placed in running wheels, and their total movement was measured.

It was found that worms exhibited an increase in movement responses if the movement ended the presentation of an aversive bright light in the escape learning condition. In the punishment learning condition, worms decreased movement when movement caused the aversive bright light to be presented. This suggests an ability of the earthworms to learn about the consequences of a response. The effect of spacing of trials and the ability of earthworms to retain the learned response was explored further by using these forms of instrumental conditioning.

This model of learning in earthworms, a simple invertebrate, has several implications for future research and investigation into the mechanisms underlying learning.

Supported by: FURSCA



JENNIFER POLINSKI, '14
Investigating Algal Symbionts in Corals from St. Lucie Reef, Florida

Faculty Sponsor: E. Dale Kennedy
 Majors: Biology, Mathematics
 Hometown: Plymouth, Mich.

Algal symbionts, commonly called zooxanthellae, live within coral tissues and provide energy to hermatypic corals through photosynthesis. Zooxanthellae density, as well as photosynthetic pigment concentration, can be used as an indicator of coral health. This study compared zooxanthellae densities and concentrations of chlorophyll a and c between four sites and two species of coral, *Montastraea cavernosa* and *Diploria clivosa*, at the St. Lucie Reef. No significant differences were observed among sites despite increasing depth farther from the inlet, suggesting reduced light penetration closer to the inlet. Significant differences were found for zooxanthellae densities and chlorophyll concentrations per zooxanthellae cell between coral species. However, there was no significant difference for chlorophyll concentrations per unit area of coral tissue between species. This result suggests that all site locations experience similar conditions despite differences in depth. It also suggests potentially different types of zooxanthellae. Ongoing research aims to identify whether genetically different types of zooxanthellae are present in these two species through DNA extraction and sequencing.

Supported by: Florida State Wildlife Grant, Save Our Seas Specialty License Plate Program, and donations from the River Branch Foundation and the Banbury Fund to the Robertson Coral Reef Research and Conservation Program at Harbor Branch



OLIVIA POTOCZAK, '15

Investigating Creative Nonfiction: Climate Change and the Younger Generation

Faculty Sponsor: Nels Christensen
Major: English (Creative Writing)
Hometown: Birmingham, Mich.

For my research project, I explored the use of creative nonfiction as a tool to help reach out to college-age people about climate change. Creative nonfiction applies creative writing techniques to true facts and stories, which has the potential to reach a wider audience than other types of nonfiction. For my first phase of research, I read broadly from creative nonfiction magazines and books, such as *Creative Nonfiction*, *Orion*, and Lee Gutkind's anthologies, to discover the elements and nuances of the genre to apply to my own writing. Paired with this, I read scientific papers and books by leading climate change scientists like Michael Mann, Richard Alley, and James Hansen to learn the science and facts behind climate change. I also read works by non-scientists like Bill McKibben and Derrick Jensen to learn how to employ the emotional element while writing about scientific fact.

My goal was to learn about the literary techniques of creative nonfiction and then to apply this knowledge by writing about the facts of climate change from my own perspective and the perspective of people my age. I wrote two creative nonfiction essays: the first one states the problems related to climate change (including looking at a local climate change issue in Albion, Michigan with the white tail deer populations), and the second one delves deeper into the reasons behind climate change, offering solutions to the previously identified problems in the first essay. I hope to get college-age men and women thinking about the climate, and even taking action.

Supported by: FURSCA—James W. Hyde Endowed Student Research Fellowship



CARL PRESSPRICH, '15

Securing Wireless Networks through Radiofrequency Identification

Faculty Sponsor: David Seely
Major: Physics
Hometown: Ann Arbor, Mich.

Zigbee is an up-and-coming radiofrequency (RF) protocol for wireless sensor and control networks; it is particularly useful for devices that involve low power, low data-rate communications, where

long battery life, small footprint, and short-range sensing are important. Systems which rely on Zigbee communications range from home automation applications to the electric grid. Several security measures for Zigbee already exist; Zigbee packets are encrypted with the Advanced Encryption Standard (AES), which scrambles the packets, and the keys to unscramble the packets are stored in each node's memory. Zigbee networks are structured around a coordinator node surrounded by router nodes, which relay information, and end devices, which are responsible for carrying out commands, like adjusting the flow rate of a release valve in a dam, and sending sensor data, like phasor measurements in the electric grid.

The weakness in Zigbee's network encryption is in the coordinator. When forming networks, the coordinator sends an unencrypted security key to nodes which are attempting to join. This network key can be intercepted by attackers wishing to gain access to the network, and with this key, commercially available exploitation tools are capable of impersonating authentic network nodes maliciously. To add resiliency to wireless networks such as Zigbee, we analyze RF transmissions by looking not at the bytes transmitted, but at the way in which they are transmitted. Our RF authenticator distinguishes packets sent from authentic devices from those sent from impersonators by analyzing correlations between incoming waves and archived RF wave data from authentic network nodes. In low-security Zigbee networks, we exposed over 90% of hacking attempts using this method. By providing a framework for network security through RF authentication, we hope to add resiliency to the control systems of the electric grid.

Supported by: U.S. Department of Energy, Oak Ridge Associated Universities, Oak Ridge Institute for Science and Education



ALISSA REDDY, '14

Phosphonoethylated Polyglycerol Amphiphiles: Liposomal Formulations for Bone Targeting

Faculty Sponsor: Clifford Harris
Majors: Biochemistry, German
Hometown: Ortonville, Mich.

In contrast to conventional drug carrier systems, sterically stabilized liposomes with PEG-corona provide several advantages, such as strongly reduced mononuclear phagocyte system (MPS) uptake, prolonged blood circulation time, reduced aggregation of the PEGylated vesicles, and improved stability of the liposomal formulations. Similar to PEG, linear and hyperbranched polyglycerol (IPG and hbPG) show excellent biocompatibility, but in addition offer possibilities for further functionalization. Novel types of lipids modified with hyperbranched polyglycerol (hbPG), linear-hyperbranched PEG-hbPG block copolymers, and random PEG-IPG copolymers can be



prepared via the combined oxyanionic polymerization of different epoxide monomers using lipophilic initiators such as cholesterol. The novel amphiphilic structures are successfully included into liposomal formulations emerging 1,2-dioleoyl-*sn*-glycero-3-phosphocholine (DOPC) as colipid. The interdisciplinary topic provides several tasks, such as the improvement of biodegradability through the attachment of phospholipids to linear-*hb*PG polymers. The reason for the formation of phosphonated liposomes is to produce yet another way to deliver drugs to the affected area, specifically for bone delivery. These liposomes will in turn be hollow drug carriers to bones.



JAMES REYNOLDS, '14

Fluid Inclusion Study of Gold-Bearing Quartz Veins in the Southern Black Hills, South Dakota

Faculty Sponsor: Timothy Lincoln
Majors: Biology, Geology
Hometown: Clarkston, Mich.

This study describes fluid inclusions present in Echo, Luckybird, and Rough Rider, three sub-economic gold prospects in the Berne Quadrangle, Black Hills, South Dakota. All are several-meter-thick quartz veins. All the inclusions are secondary, lying along micro-fractures, and thus record the post-formation history of the vein. Three types of inclusion are present: type 1, regular to semi-regular shapes with aqueous fluid + carbonic fluid +/- carbonic vapor; type 2, small regular inclusions with aqueous fluid; type 3, highly irregular inclusions with aqueous fluid + vapor + halite. Type 1 inclusions have Tm dry ice (-56.7 to -56.5) suggesting the carbonic phase is nearly pure CO₂. Compositions were obtained using % fill (10-95) at Tm clathrate (7.0-12.0°C) and Th CO₂ (8.6-21.7°C). They have between 2 and 3 wt% NaCl and have two groups of CO₂, 15-35 wt% and 70-80 wt%. The irregular shape of type 3 inclusions suggests they were decrepitated and healed. Their compositions were obtained using Tm ice (-25.7 to -25.3°C), Th aqueous (124.0-158.2°C), and Tm halite (138.1-174.2°C). They have approximately 70 wt% H₂O, 18-20% NaCl, and 9-11% CaCl₂. The Echo vein has significantly more vacant inclusions and high CO₂ inclusions than the other veins, and its high salinity inclusions are associated with sulfides.

In this regional metamorphic terrain, we assume the veins were in thermal equilibrium with the surrounding rocks and thus the intersection of the isochores with P-T paths gives P-T conditions of entrapment. Regional P-T histories from several published studies and unpublished data all show similar clockwise trajectories through P-T space. The type 3 isochores intersect this path close to the end of the isobaric heating portion near the peak conditions, or under near recent, low P-T conditions. Their irregular shape suggests that they are relics of earlier, possibly primary, inclusions. All the other inclusions intersect the retrograde path during isothermal decompression. The low-CO₂ inclusions intersect at near-peak conditions and as wt% CO₂ increases, the pressure at intersection decreases. This means that CO₂ is becoming more abundant through time in this part of the path. This study suggests that these veins formed prior to peak metamorphic conditions and if any inclusions we observed evolved from the ore forming fluid, they would be the high salinity inclusions.

Supported by: FURSCA



ELLEN REDNER, '14

Reconstruction of Eruption Conditions Based on Crater Rim Stratigraphy at Miter Crater, Ice Springs Volcanic Field, Black Rock Desert, Utah

Faculty Sponsor: Thomas Wilch
Major: Geology
Hometown: West Bloomfield, Mich.

The primary study objective is to reconstruct a detailed eruptive history of late stages of the growth of the small basaltic Miter Crater volcano, by interpreting the stratigraphy on both the inner and outer walls of the cone. This project is part of collaboration between Albion College and The College of Wooster geology faculty and students studying the Ice Springs Volcanic Field, Black Rock Desert, Utah.

The volcanic stratigraphy from the inner wall of Miter Crater reveals a sequence of cooled bombs and ejecta that were explosively erupted. Approximately 100 individual large bombs within the inner wall were identified and measured for their height, width, and vesicle content. Four samples were collected for detailed composition and vesicle analyses. A continual mildly explosive eruption style is inferred for this section.

A ~3 m thick roadcut rock outcrop on the outer flank of Miter Crater was also described and sampled to provide a more comprehensive sequence of eruptive activity. This outcrop is at a lower elevation but is stratigraphically above the inside outcrop. This section shows alternations in both grain size and degree of welding, suggesting changes in eruption intensity and style. Eleven samples were collected, ranging in size and intensity of welding. Two eruption styles are inferred during the last stages of cone growth: continual mildly explosive eruption of bombs at the base and middle of the section, followed by more vigorous lava fountaining and extreme welding of bombs at the top.

Supported by: FURSCA, Lawrence D. Taylor Undergraduate Geology Research Fund, Herbert H. and Grace A. Dow Professorship in the Sciences, Albion College Geology Alumni Fund



KEVIN RHEE, '14

When Politics Meets Science: A Comparative Analysis of the Wartime Human Experimentation Programs in Nazi Germany, Imperial Japan, and the United States from the 1930s to 1994

Faculty Sponsor: Geoffrey Cocks

Majors: History, Biology

Hometown: Seattle, Wash.

Nazi Germany, Imperial Japan, and the United States are three countries that had conducted massive forced human experimentation programs in the twentieth century. The wars during which these programs transpired enabled such extreme events to take place, and medical doctors took charge of them. What drove these “healers” to participate? Though racism, ethnocentrism, and fear played an important role in the era of imperialism and the Cold War, the government—both publicly and secretly—played an even more crucial one by exploiting these sentiments and systematically influencing the doctors and scientists’ beliefs. This thesis finds many policies involving education, indoctrination, bureaucratization, and monetary compensation having been integral to the government fulfilling its political agendas. Details of the experiments by the three regimes reveal they had a great interest in developing weapons, war medicine, and techniques for human population control. The experimenters’ postwar reflections on their experiences widely varied from being regretful and apologetic to being indifferent and self-justifying. From this, one can argue how powerful the policy-making can be on shaping the individual’s mentality and behavior. Unfortunately, some countries still force their citizens into experimentation today, and to stop and prevent this, it is essential to keep government transparent and accountable as much as possible. Furthermore, just as education proved to be crucial to shaping people’s minds, it could instead be used to promote universally positive ideas about peace, empathy, and coexistence.

for victims of trafficking. Aftercare provides the therapy and counseling for victims who have been trafficked while also educating them and preparing them for a future without slavery.

To conduct this research, I first completed an extensive literature review, including statistics on human trafficking both in the U.S. and around the world, past research on human trafficking, and memoirs written by survivors. In the second phase, I conducted interviews with three different aftercare organizations and analyzed the data they shared. One of the most valuable results of this research revealed that “talk therapy” doesn’t seem to be as effective as other forms of therapy in many cases (as seen in one of the organizations I interviewed, including equine therapy and dance therapy). As the final aspect of my research, I looked into how music therapy could be used in aftercare. Based on research done with music therapy in aiding victims of trauma and abuse, I saw many similarities and looked into how that could be translated into aftercare for survivors of sex trafficking.

Supported by: FURSCA—Robert M. Teeter Research Fellowship Endowment



ELLEN RIINA, '14

Targeting Tourists: The Murals of Belfast

Faculty Sponsor: Perry Myers

Major: International Studies

Hometown: Farmington Hills, Mich.

During my study abroad experience in fall 2012, I traveled to Belfast, Northern

Ireland. There I experienced the effect of the expansive public murals that line the city streets and display the historical conflict between Irish Catholics and British Protestants. Both groups claim territorial rights to Northern Ireland; the Irish minority believes it should be reunited with the Republic of Ireland and the British majority believes that it should remain a part of the United Kingdom. Although this conflict has cooled since the Good Friday Peace Agreement in 1998, a sense of division and mistrust still plagues the city of Belfast.

My thesis provides a visual analysis of the murals in Belfast as a barometer of the ongoing political strife and historical context for the British and Irish residents. The murals are also a tourist attraction that helps to provide substantial monetary funds for the blue-collar city of Belfast. However, some find the exploitation of images surrounding death, civil unrest, and ethnic conflict to be in bad taste and detrimental for the city’s future. The murals in Northern Ireland are important because they are symbolic of the challenges of reconciliation, the struggle to include non-state actors after a conflict, and how opposing sides view themselves and attempt to appeal to outsiders for support.



NORA RIGGS, '14

Music Therapy as Aftercare for Sex-Trafficking Survivors

Faculty Sponsors: Lia Jensen-Abbott,

Trisha Franzen

Major: Music

Hometown: Belleville, Mich.

In the world today, there are more slaves than there were during the entirety of the transatlantic slave trade: current records show over twenty-seven million people are victims of this atrocity also known as human trafficking. My research aimed to explore sex trafficking, specifically its occurrence in Michigan and Ohio, and the various organizations that offer aftercare



BRIDGET RUFF, '14

The Importance of Light and Shadow in the Prints of Edward Hopper

Faculty Sponsor: Bille Wickre
Majors: Art, Art History
Hometown: St. Clair Shores, Mich.

American artist Edward Hopper is sometimes referred to as the “silent witness” because of his quiet scenes of everyday life. He depicted his subjects as close to reality as possible while also relying on his memory, which transformed commonplace scenes into something extraordinary. Although many of his mature works were oil paintings, he also created a body of outstanding prints. Hopper taught himself how to etch and eventually bought his own printing press with which he created images of the life of New York City. I will focus on five of his prints, including *Night Shadows* which is part of Albion College’s print collection. One of Hopper’s most successful prints, *Night Shadows* is an eerie depiction of a man walking along a deserted street at night. The scene came to Hopper while he was riding one of New York’s elevated trains. That fleeting moment in time led to an idea that went on to inspire much of his later work.



LUKE SALBERT, '14

Investigation of an alpha-synuclein-Proteasome Interaction: A Model for Parkinson’s Disease in *Drosophila*

Faculty Sponsor: Kenneth Saville
Major: Biology
Hometown: Woodhaven, Mich.

Five to fifteen percent of Parkinson’s disease cases appear to have a genetic origin, yet the etiology of familial Parkinson’s disease remains largely unknown. One possible explanation is an interaction between the protein α -synuclein and the proteasome, the main cellular mechanism for degrading proteins. Previous research has investigated genes for each of these individually, but none have investigated this interaction. Through targeting expression of these genes to the eyes of *Drosophila melanogaster*, this proposed interaction can be supported if an increase in eye degradation is observed. I investigated the presence of these genes in experimental *Drosophila* and compared them with phenotypic severity. If a correlation through this comparison is observed, the rough-eye phenotype can be attributed in part to these relative transcript levels and the presence of the genes. Progeny analysis and ongoing molecular characterization of the experimental flies used in data collection suggest the genes of interest are present. I observed an enhanced rough-eye phenotype in the experimental *Drosophila* flies expressing α -synuclein with disrupted proteasome function, potentially supporting the proposed α -synuclein/proteasome interaction in familial Parkinson’s disease.

Supported by: FURSCA—Kenneth Ballou Research Endowment for Biology



REBECCA RUTHBERG, '14

The Haydn Trumpet Concerto: Movements I (Allegro) and II (Andante)

Faculty Sponsor: James Ball
Majors: Biology, Music
Hometown: Lisle, Ill.

The stepwise movement which opens the Haydn trumpet concerto is very significant, as the work, composed in 1796, was written for the keyed trumpet developed by Anton Weidinger. Before the addition of keys, the “natural” trumpet did not have valves or keys, so it could only play notes in the harmonic series which were wide intervals except in the upper register, and only those notes the lips could control. Weidinger, who was an excellent trumpet player, brought considerable success to the keyed trumpet. The chromatic and stepwise motion Haydn uses could not have been played before the invention of the keyed trumpet. The keyed trumpet’s popularity was short-lived, however, because soon thereafter the valved trumpet was invented. This new trumpet had a much more pleasant sound and was easier to play. Movements I and II of Haydn’s concerto showcased the capability of the keyed trumpet to play in a diverse way, not only stepwise, but with lower octaves and with more emotion.



STEPHANIE SANDERS, '15

Progress in Developing a More Sustainable Shaped Nanoparticle Synthesis on Carbon Substrates

Faculty Sponsor: Kevin Metz
Majors: Chemistry, Mathematics
Hometown: Farmington Hills, Mich.

Shaped palladium nanoparticles (PdNPs) have the potential to be selective catalysts. Unfortunately, their size can limit their use in heterogeneous catalysis because they are difficult to remove from solution after a reaction. Attaching nanoparticles to a support addresses this issue. However, composite formation is typically a two-step process, and the time and energy involved circumvents the energy-saving goals of catalysis. Additionally, current shaped nanoparticle syntheses usually occur at high temperatures, which is also counterproductive. We have developed a method to synthesize shaped nanoparticles directly onto carbon supports using a mild reductant at room temperature. Specifically we have developed a method to create shaped PdNPs directly on porous carbon microspheres

using coffee as a room temperature reductant. By adding ions, such as Br^- and Fe^{3+} , cubic and right bipyramidal nanoparticles can be synthesized. Other additives, such as ethylene glycol, are added to change the reaction kinetics, giving greater control over shape. Analysis by SEM indicates that our synthesized PdNPs are roughly 50 nm in dimension. The size, shape, and distribution of nanoparticles varied based on the ratios of the reactants in the different steps of the synthetic process. Current results from different ratios of reactants and adjustments in the synthetic process will be presented.

Supported by: FURSCA—Robson Family Fellowship, Faculty Development Committee



EMMA SCHAFF, '14

Paper Clips, Puzzles, and Parents: Investigating the Relationship between Family and Creativity

Faculty Sponsors: Mareike Wieth, Andrea Francis
Majors: Psychological Science, Spanish
Hometown: Jackson, Mich.

What factors of a child's family life can influence his or her level of creativity as an adult? This study was designed to investigate the relationship between various perceived aspects of family and their impact on creative problem-solving. Three key components of family that have been shown to affect creativity are family structure, parenting style, and family environment. In the current study, participants took three surveys to measure each aforementioned component: Family Demographic Survey (to measure family structure), Parental Authority Questionnaire (to measure level of authoritarian, authoritative, and permissive parenting), and Family Assessment Device (to assess family environment). To test creativity, participants were given the Remote Associates Task (RAT) and Guilford's Creative Uses Task. The RAT is a convergent creativity task where a single answer must be selected. It consists of words (e.g., "duck/dollar/fold") for which participants must come up with the fourth word that when combined with any of the three makes a new word/phrase (e.g., "bill" to make "duck bill/dollar bill/billfold"). Guilford's Creative Uses Task is a divergent creativity task where as many solutions as possible must be generated. Our participants were asked to come up with as many creative uses as possible for a paperclip, a newspaper, a picnic table, and a deck of Uno cards.

After controlling for family structure and environment, both authoritarian and permissive parenting styles were related to decreased levels of convergent creativity (fewer correct RAT responses). Decreased divergent thinking (fewer creative uses) was also related to increased authoritarian parenting, but not to the reported level of permissiveness. The findings of this study indicate that different parenting styles can have varied influences on types of creativity.

Supported by: FURSCA—James W. Hyde Endowed Student Research Fellowship



ALEX SCHUMAKER, '14

Kinetic and Structural Analysis of the Group I Catalytic Ribozyme

Faculty Sponsor: Christopher Rohlman
Majors: Biology, Mathematics
Hometown: Clinton Township, Mich.

Group I introns are catalytic RNAs capable of performing a range of phosphotransesterification reactions including self-splicing and RNA cleavage.



NOELLE SCELINA, '14

Characterization of Non-Uniform Groundwater Input into the Upper Kalamazoo River, Michigan

Faculty Sponsor: Thomas Wilch
Major: Geology
Hometown: Strongsville, Ohio

The Kalamazoo River derives much of its water from groundwater seeping into its bed and banks. This research focuses on documenting the variability, magnitude, and controls of this groundwater seepage. Detailed stream bed temperature maps constructed in summer 2013 along ~100 m sections of the North Branch of the Kalamazoo River indicate variable groundwater input. Broad areas of the stream are above 20°C with smaller localized cold spots, ranging from 1.0 m² to less than a 0.2 m² in size, having temperatures as low as 10°C. Measured seepage rate in a cold area is 3.9x10⁻⁴ cm/sec compared to 3.2x10⁻⁶ cm/sec in a warm area. The 100 times greater seepage rate in the cold area indicates the stream is fed disproportionately by small areas of focused flow. Streambed piezometer data also indicate significant inhomogeneity in groundwater pressure throughout the stream bed.

In addition to detailed temperature mapping, reconnaissance mapping along a 9-km reach shows numerous springs in the riverbed and along its banks. The largest measured spring has a flow rate of 6.5x10⁻³ m³/sec. Many of these are expressed geomorphically as small reentrants, presumably caused by basal sapping. Cold areas show slight clustering in approximately 100 to 400 m sections but still show considerable variability in location. These reentrants are visible on high resolution Google Earth imagery but do not appear on published maps. Elevation and soil data mapping indicate that there is not a simple correlation between sediment type or topography and location of springs.

Supported by: FURSCA—Bruce A., '53, and Peggy Sale Kresge, '53, Science Fellows, Lawrence D. Taylor Undergraduate Geology Research Fund, Albion College Geology Alumni Fund



Kinetic analysis is a great technique to use in order to gain a better insight into the catalytic abilities and highly conserved folding structure of these ribozymes. This study focuses on *Anabaena* and *Tetrahymena* ribozymes as models. Through a series of kinetic assays, one can visualize the time lapse of the reaction between these ribozymes and substrate molecules. The knowledge gained about the kinetic properties of these systems can be used as a model and applied to other systems.

Supported by: FURSCA

MICHAEL SEARS, '15

(See Ethan Frick, '16, Michael Sears, '15)



ORI SHEWACH, '14

Big Five, Social Dominance, Authoritarianism, and Morality as Predictors of Social Beliefs

Faculty Sponsor: Andrew Christopher
Major: Psychological Science
Hometown: Ann Arbor, Mich.

Moral conflict is often resolved by aligning factual beliefs with moral evaluations on social and political issues. To our knowledge, no study has examined the extent to which personality and ideological variables underlie moral evaluations of and factual beliefs about social issues. This study tested a model of relationships among the Big Five, social dominance orientation (SDO), authoritarianism, moral evaluations, and factual beliefs about social issues.

We recruited 337 participants (56% women) from a small, liberal arts college. Through an online survey service called Amazon MTurk, participants completed measures of the Big Five, SDO, authoritarianism, and an expanded version of Liu and Ditto's scales of morality and factual beliefs on real-world issues. The six issues were divided into a liberal and a conservative scale of morality and beliefs. We analyzed fully saturated sequential-mediator path models in which the relationships between the Big Five and factual beliefs were mediated by authoritarianism and SDO, followed by morality.

For conservative issues, significant pathways were found from the Big Five factors of agreeableness to SDO and openness to authoritarianism, which both in turn predicted morality, resulting in the prediction of conservative factual beliefs. For liberal issues, a significant pathway was found from the Big Five factor of openness to authoritarianism, which in turn predicted morality, resulting in the prediction of liberal factual beliefs.

As previous research has established consistent relationships between agreeableness, openness, SDO, authoritarianism, and political ideology, the discovery

of the pathways from agreeableness and openness to both liberal and conservative beliefs showed that SDO, authoritarianism, and morality were the mechanisms through which personality is connected to beliefs.

Supported by: FURSCA

JOE SILVESTRI, '15

(See Atraeyu Ishmon, '14, Joe Silvestri, '15)



BRITTNEY STANTON, '14

Annotating Fosmids in *Drosophila*

Faculty Sponsor: Kenneth Saville
Major: Biology
Hometown: Rochester Hills, Mich.

This research is a DNA sequence analysis project that is part of a larger project being carried out by a group called the Genomics Education Partnership (GEP), using web-based sequence analysis tools developed at Washington University at St. Louis (WUSTL). Four fosmids were assigned by the Genomics Education Partnership for annotation. This is part of a much bigger project, and the findings will be added to a large database on the GEP website. A variety of online resources have been used in the annotation of the genes. The genes were from the *Drosophila melanogaster*, *D. ananassae*, and *D. biarmipes* species. The annotation of the four fosmids is complete, and all the projects had gene matches. Contig5 had two gene matches; contig29 had one gene match but did have two pseudogenes, with pseudogenes being genes that are present in *D. melanogaster* but not in *D. biarmipes*; contig58 had two gene matches with one new gene, and contig38 had five gene matches. Reports for all four fosmids have been submitted to the GEP.

Supported by: FURSCA



EMMA STAPLEY, '16

Artistic Creation as a Means of Overcoming the Horrors of Trench Warfare

Faculty Sponsor: Mary Collar
Majors: English, Biology
Hometown: Rockford, Mich.

The First World War reshaped nations, redefined the idea of international conflict, and had a profound impact on the modern worldview. Amid the carnage of the trenches, it is easy to overlook the incredible creative outpouring that the war produced. To examine this ability to overcome trauma through artistic creation, I researched (utilizing a variety of both historical and literary sources) and wrote a 100-page historical fiction novella set in the First World War. The novella's main character is a young British officer who is completely unprepared for the challenges of leading

his men through bombardments, poison gas, shell-shock, and suicidal attacks on the German lines. In an attempt to explain his experiences to his older sister, the main character writes a fantasy story that parallels his struggles to cope with the war's brutality. The narrative switches between the trenches and a fantasy world that grows from a simple allegory for anything the character feels incapable of describing directly to an indispensable tool that helps him to understand the effects of the war, his fellow soldiers, and his own ability to find meaning in the chaos around him.

Supported by: FURSCA

To test this hypothesis, we cultured THP-1 cells to model MN function. Using qPCR (n=2) we found that THP-1 MNs express the Cd11b portion of Mac-1. Next, in vitro MN chemotaxis assays allowed us to determine that sJAM-C is chemotactic for MNs in a concentration dependent fashion (n=3, p<0.05). In addition, our western blotting showed that sJAM-C induces the phosphorylation of ERK in a time-dependent fashion (n=3).

Our results indicate that THP-1 MNs express Mac-1, and suggest that sJAM-C binding to Mac-1 induces THP-1 migration via the ERK pathway.

Supported by: FURSCA



JOSEPH THOMAS, '14

Bio-fuels: An Exploration in Environmental and International Ethics

Faculty Sponsor: Bindu Madhok
Majors: Chemistry, Philosophy
Hometown: Canton, Mich.

In this paper, I examine the recent developments in agricultural bio-fuels and carry out a cost-benefit analysis of both first- and second-generation fuels. The impact of this new industry reaches beyond the transportation industry and even beyond environmental concerns to questions about global hunger. As we try to find alternative energy sources, we need to be aware of the effects of our new technologies. In this case, that involves weighing the benefits of cleaner emissions and renewable fuels versus the costs of increasingly volatile food prices, which often have the greatest negative effects on those who are growing our fuel crops in the first place.



ALLISON VELTKAMP, '17

1,000 Letters Home: A Michigan Soldier's Journey during World War II

Faculty Sponsor: Wesley Dick
Majors: Psychological Science, Sociology
Hometown: Cedar Springs, Mich.

World War II was "the greatest cataclysm" in history. Impacting the globe, the war also came home to every village, town, and city in America. Michigan played a prominent role in the American war effort both at home as the "Arsenal of Democracy" and in sending its young men to serve in the military. World War II has been labeled as the "Good War," and the men and women who stepped up at home and abroad have been identified as the "Greatest Generation." Given the immensity of the war and the reality that it concluded nearly 70 years ago, the question arises: How can we connect to that history in 2014? One possibility is putting a face on the story. This study attempts to do that through the experience of Aarol W. "Bud" Irish.

Born in Hemlock, Michigan on January 11, 1922, Bud Irish grew up on a dairy farm. He volunteered for the army in 1942 and served in Europe. Along with millions of other American G.I.s, Bud Irish answered the call of his country. What is remarkable in Bud Irish's case is that he was a prolific letter writer and, upon his death in 2006, his daughter Teresa K. Irish discovered a trove of nearly 1,000 handwritten letters postmarked from November 1942 to December 1945. What do those letters tell us about one soldier's World War II experience? Do the letters confirm or revise the notion that World War II was the "Good War"? Answers to those questions are possible thanks to the commitment of Teresa Irish in sharing the letters through the publication of *A Thousand Letters Home, One World War II Soldier's Story of War, Love and Life—The World War II Correspondence of Aarol W. "Bud" Irish*. This study, begun in Professor Wesley Arden Dick's history class, "America in Crisis: Great Depression, World War II, and the Cold War," explores the letters and Teresa Irish's interpretive account with the goal of personalizing the war through the journey of Bud Irish.



ELIZABETH TUMA, '14

The Effect of sJam-C on Monocyte Migration through the ERK Pathway

Faculty Sponsor: Bradley Rabquer
Major: Public Policy
Hometown: Marquette, Mich.

The migration of leukocytes, including monocytes (MNs), is a major contributor to inflammation in autoimmune diseases such as rheumatoid arthritis (RA). In RA, MN migration to the joint synovial tissue is aided by junctional adhesion molecules (JAMs) expressed by endothelial cells (ECs). The EC JAMs bind integrins found on leukocytes, promoting their ingress. JAM-C is the ligand for the integrin Mac-1 (Cd11b/CD18). Like some adhesion molecules, JAM-C has been found in soluble form, and our recent work has shown that soluble JAM-C (sJAM-C) is upregulated in RA synovial fluid. Some soluble adhesion molecules have also previously been shown to induce leukocyte migration. Based on this, we hypothesized that sJAM-C promotes THP-1 MN migration by binding Mac-1 and inducing the phosphorylation of extracellular signal-regulated kinases (ERK).



LAURA VERHULST, '14

A Markov Chain Analysis of the National Football League's Overtime Rule

Faculty Sponsor: Mark Bollman
Majors: Mathematics, Economics and Management
Hometown: Brighton, Mich.

My research uses Markov chains to compare the new overtime rule for the National Football League with the previous rule. The old overtime rule stated that whichever team was the first to score in overtime won the game. This rule gives the team with the first possession a significantly higher probability of winning. The new rule, which went into effect during the 2012 regular season, says that a team may only win on their first possession if they score a touchdown. Analysis will be done for the post-season, where ties are not allowed, and the regular season, where overtime lasts a maximum of fifteen minutes and there is a possibility of a tie. This project will also analyze the new decisions coaches must make with the new rule. The purpose of this research is to determine if the new rule was successful in bringing the probability of winning the game closer to 0.5 for each team as well as to determine when it would be statistically advantageous to call riskier plays in order to score a touchdown. Upon analysis of the two rules it is clear that the rule was successful in bringing the probabilities closer to 0.5 although the probability of winning is still higher for the team with first possession. Analysis of the decision a coach must make yielded an equation, depending on the level of risk for the play, to determine if it is advantageous.

learning and using English. Through this research, I had to take into account the colonial and contemporary history of Costa Rica, the conceptualization of teaching and learning at Pará School, the nature of language choice and use, and students' culture and identity in order to create meaningful and relevant teaching.

ANGELA WALCZYK, '16

Comparative Genomic Analysis of a Region (Contig59) of the Fourth Chromosome from Two Species of *Drosophila*

Faculty Sponsor: Kenneth Saville
Major: Biology
Hometown: Clinton Township, Mich.

Through the resources and help of the Genomics Education Partnership (GEP), I worked to create gene models for the possible genes found within the contig59 sequence of the *D. biarmipes* genome by completing a computer analysis of my data through genomic databases suggested through GEP. The goal of the GEP is to annotate, or assign functions to, the genomes of different species of *Drosophila*. In particular, GEP focuses on genomic regions found within chromosome four so that a finished sequence of this chromosome among various species can be created. The comparisons found among species will be used to distinguish patterns of genome organization in regards to its control of gene expression. The fourth chromosome is particularly important because it is heterochromatic, meaning that it has many repeated sequences and low meiotic recombination. Also, the farthest region of the fourth chromosome codes for roughly eighty genes. Through an understanding of chromosome organization and the expression of the fourth chromosome discovered by analyzing the genome of various *Drosophila* species, new discoveries can be made regarding the mechanisms of gene regulation.

In my particular sequence of the *D. biarmipes* genome, contig59, there are an estimated two genes found through the prediction tracks of the genome browser. Regarding these two genes, there are twelve variations of the first gene and four of the second gene. I will present a detailed analysis of these genes.



MIRANDA VOEGE, '14

Integrating Art and Movement into English Lessons at Pará School, Costa Rica

Faculty Sponsor: Kyle Shanton
Major: English/Language Arts
Hometown: Indianapolis, Ind.

While working with second grade English language learners at Pará School in Costa Rica, I used action research to figure out how to engage students to use their English more actively and interactively. This process led me to create, enact, and evaluate lessons that featured use of multiple modalities (e.g., acting, creative writing, dancing). I began by gradually getting students used to being out of their seats—because they regularly sit in their seats and write in notebooks. This was accomplished through a mix of group work and whole class activities. Next, I invited students to incorporate acting, which integrated these different modalities in more fluid ways. Finally, the students and I incorporated dancing and singing—to Disney's "I Just Can't Wait to be King" from *The Lion King*—to encourage their confidence and bolster their skill with



HEATHER WALDRON, '14

The Volcker Rule: The Impact of Bank Inventories on Risk and Volatility

Faculty Sponsor: Jon Hooks
Majors: Biology, Economics and Management
Hometown: Petoskey, Mich.

The Volcker Rule's final regulation, which passed in December 2013, will have a resonating effect on the banking industry. The goal of the Volcker Rule is to improve the soundness of our economy and to

reduce systematic risk by limiting proprietary trading by our largest banks. A market making exemption exists in the regulation, which allows banks to buy and sell financial instruments to meet customer demand. The Volcker Rule specifies that a bank's inventory, the stock of financial securities held to make markets, must not exceed the expected near-term demand. By limiting inventories, regulators hope that risk and proprietary trading will also be reduced. This presentation will examine the rigor of such a relationship by analyzing the correlation of a bank's inventory and the volatility of their trading revenue. The data support that there is a positive relationship between inventories and risk, which defends the efficacy of the Volcker Rule. However, various side effects are possible if inventories become too limited. It is key for regulators to find a balance between these two points and understand the market repercussions for too lax or too stringent a policy.

ANDREA WALLES, '15

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the U.S.A. and France—Innov/Screens)

length) and presumably fed on the wide variety of very small mammals and lizards they are found with.

Snakes have been an understudied group due to their scarcity and complexity. This study adds to our understanding of the role snakes played in otherwise well-studied Eocene vertebrate faunas.

Supported by: Lawrence D. Taylor Undergraduate Geology Research Fund, Albion College Geology Alumni Fund



ANNA WARD, '14

Prevalence and Intensity of *Aeromonas hydrophila* in Frog Populations in South-Central Michigan

Faculty Sponsor: E. Dale Kennedy
Majors: Biology, Psychological Science
Hometown: Traverse City, Mich.

Amphibian populations have been declining globally due to multiple factors, including habitat loss, pollution, and pathogens. Several diseases, including fungal infections and ranavirus, have been causing mass mortality in frog populations. A common pathogen of frogs that may lead to more serious diseases is *Aeromonas hydrophila*, an opportunistic bacterium found naturally in aquatic systems. Red-leg disease can result from an infection of *A. hydrophila* that causes hemorrhaging of capillaries. The purpose of this study was to gain basic knowledge of the prevalence of this bacterium on the skin of frogs. In 2013, I caught 81 frogs in several locations in south-central Michigan and swabbed their skin. I cultured the swabs, and examined the cultures for presence of *A. hydrophila*. I found *A. hydrophila* on 71 (87.6%) of the frogs. A higher prevalence of *A. hydrophila* in Michigan may be due to multiple different factors and could potentially impact the susceptibility of frog populations to future pathogens.

Supported by: FURSCA—Bruce A., '53, and Peggy Sale Kresge, '53, Science Fellows, Chickering Endowed Professorship



EMILY WERNER, '14

Knowledge of Physical Activity and Nutrition Recommendations in College Students

Faculty Sponsor: Heather Betz
Major: Biology
Hometown: Manchester, Mich.

It is estimated that 32% of college students are overweight or obese. Physical activity and nutrition are two factors that play a role in this problem. In 2008, the Physical Activity Guidelines for Americans were released, which stated the average adult should participate in at least 150 minutes of moderate intensity physical activity per week. It has been reported that only 16% of women and 25% of men in the United States



BIAN WANG, '14

Eocene Snakes from the Green River Basin, Wyoming

Faculty Sponsor: William Bartels
Major: Geology
Hometown: Wuhan, China

This study describes Eocene snakes from the Wasatch and Bridger Formations of Wyoming, which were deposited by ancient rivers flowing into a subtropical lake about 50 million years ago. These formations preserve diverse assemblages of mammals, reptiles, and other vertebrates. Specifically, the specimens in this study are from the Wasatchian and Bridgerian Land-Mammal Ages (Zones Wa-7 through Br-1b), which represent the important early to middle Eocene transition when a second wave of modern orders of mammals appeared.

The fossil snakes are represented by only their vertebrae since their other skeletal elements are too delicate to be commonly preserved. Identification is based on morphological differences of their vertebrae, which contain complex articulation features that allow for the great flexibility of snake bodies. The fauna included a primitive burrowing aniliid snake (*Coniophis*, the earliest snake known from North America) and a few boids (boa constrictors). Erycine boas today are Old World small burrowing and terrestrial predators on small game such as rodents. Boine boas are the familiar small to large, terrestrial and arboreal boas with a global distribution. Boid genera have been tentatively identified as *Boavus*, *Calamagras*, *Cheliophis*, and *Ogmophis*. These Eocene snakes were very small in size (individual vertebrae are a few mm in



are meeting these recommendations. The nutritional side does not bode much better, with 98.8% of adults consuming less than the recommended servings of whole grains and 35.2% consuming less than the recommended servings of milk.

In 2012, Wojcicki and Heyman demonstrated that less than half of adolescents, ages 16-17, were aware of the existence of federal nutrition programs and guidelines. Most (92.4%) were aware of the Food Guide Pyramid; however less than half (43.5%) were aware of the 5-A-Day Program and only 29.3% were aware of the Dietary Guidelines for Americans. Understanding the factors that contribute to the prevalence of overweight and obesity in college students, including physical activity and nutrition patterns, may help in addressing the problem before it escalates even higher. Therefore, the purpose of this study was to assess the physical activity and nutrition knowledge of college students and assess whether they are meeting the national guidelines for both.

websites. These results imply that health providers should present less serious illnesses first in order to combat health anxiety.

Supported by: FURSCA



JUSTIN WIKE, '14
Small Vicious Wars: U.S. Counterinsurgency, 1962-2014

Faculty Sponsor: Christopher Hagerman
 Majors: History, Anthropology
 Hometown: Dexter, Mich.

Due to the significance of counterinsurgency (COIN) warfare in U.S. foreign policy, a look into how the U.S. has fought insurgencies from Vietnam to the recent war in Iraq and the present war in Afghanistan seems timely. This research highlights not only the difficulties of waging a war using COIN, but also the specific issues the U.S. has had with COIN. The purpose of this research is not only to identify how the U.S. has fought in a COIN war, but also to determine what the U.S. has done right and what it has done wrong in these conflicts. This research was conducted using multiple scholarly sources, as well as many primary sources. The primary sources served as a way to analyze the effects a COIN operation has on the people who are involved, as well as serving as a way to understand how COIN is implemented by the individual. The scholarly sources served to give a wider view of the counterinsurgency operations and to show how major decisions affected COIN operations. Throughout the research it has become apparent that the U.S. has had difficulty waging COIN operations. Many of the difficulties the U.S. has experienced in these operations have stemmed from a lack of knowledge about COIN, a failure to learn from past conflicts, and unwillingness to implement COIN. If the U.S. is to be effective in future COIN operations, it must take all of the lessons it has learned from past wars with regard to COIN and apply them to future conflicts where appropriate.



DANIELLE WESOLOWICZ, '14
Dr. Google: How the Ordering of Search Results of Health Information Online Affects Health Anxious Individuals

Faculty Sponsors: Mareike Wieth, Andrew Christopher
 Major: Psychological Science
 Hometown: Northville, Mich.

Previous research has shown that health anxious individuals tend to shift attention to health information. Seventy-two percent of all Internet users reported having searched for health information in the past year. Self-diagnosers can often misinterpret the ordering of the results as a representation of the likelihood of these disorders. This study was designed to test whether the order of online search results influences health anxious individuals' memory for health words. It was predicted that health anxious individuals would have better memory for health words when presented with a more serious compared to a less serious illness first. Participants, low and high health anxious individuals, were asked to imagine having chronic headaches and then directed to a website that looked identical to the Internet search engine Google. Half of the participants were given a results page that listed a less serious illness first (e.g., rebound headaches) and the other half were shown a more serious illness first (e.g., brain tumors). In order to measure participants' sensitivity to the health information, they were given a recognition task that included both words from the online reading and general health words. Results revealed that health anxious participants who read about the more serious compared to the less serious illness first were significantly more sensitive to health words from the

BRIAN WU, '14

(See Rebecca Guntz, '14, Brian Wu, '14)



ALEXANDRA YAW, '14
Sleep and Nutrition: A Study of the Relationship with Athletic Performance

Faculty Sponsor: Tammy Jechura
 Major: Psychological Science
 Hometown: Birmingham, Mich.

This study examined the relationships among sleep, nutrition, and athletic performance, measured as handgrip strength and fatigue, in college students. Both sleep and nutrition are issues that impact many college students, and athletic

performance has been shown to be dependent upon the quality and amount of sleep obtained. However, prior studies have not addressed these issues specifically in college athletes, or the interactions of sleep and nutrition on athletic performance. The current research aimed to measure sleep behaviors and nutrition in college student athletes and their impact on athletic performance, as measured by handgrip fatigue time and handgrip strength. This study also examined the use of newly available technologies that give an objective, in-depth look at activity levels and sleep architecture in a natural setting.

Data were collected from NCAA Division III student athletes. The Pittsburgh Sleep Quality Index was used to measure subjective sleep quality, and a survey created by the researcher that incorporates questions from the 2007 CIGNA Healthy Eating Survey was used to measure nutritional intake and eating behaviors. Objective measures of sleep were collected using BodyMedia Core Fit monitors and Zeo Sleep Managers, and objective measures of athletic performance were collected in the form of handgrip fatigue time and handgrip strength.

Regression analyses revealed that time spent in REM sleep was the greatest predictor of handgrip strength, while length of sleep and behavioral eating score predicted time to handgrip fatigue.

Supported by: FURSCA

ALBION/ÉCOLE SUPÉRIEURE DE VENTE (SDV) ENTREPRENEURIAL EXCHANGE

Faculty Sponsors: Emily Nolan (Gerstacker), Laurel Draudt (Gerstacker), Joy Nakfoor (Economics and Management) with Annie Towhill (SDV) and Catherine Bruneteaux-Swann (SDV)

We are pleased to announce another successful international exchange of students—blending students from Albion College’s Gerstacker Institute for Business

and Management with students from France—to create international and intercultural business plans. The Student Entrepreneurial Exchange (SEE) partnership was started in 2008 and lives on in Gerstacker’s annual exchange with Ecole supérieure de Vente (SDV, a business school) located in Saint-Germain-en-Laye, near Paris. The goal was simple—create a partnership and student exchange for upperclassmen (juniors and seniors) around experiential learning opportunities dealing with entrepreneurship, innovation and change, and business plan development and implementation.

Participants, along with their advisors, spent one week in France in fall 2013. During this time, students worked in teams developing market surveys and started to lay the groundwork for business plan development. They created a market research plan and marketing strategy for their chosen venture. The student teams were coached by French and American experts in business plan and marketing strategy topics and at the end of the week students presented their preliminary business plans to peers and members of the SDV community. With relationships solidified and plans in place, the teams took on the next steps to continue to work together—utilizing virtual meeting rooms and other technology to stay in touch and move the plans forward. In spring 2014, the French students visited with their American teammates at Albion to put the final touches on the plan. The teams will make a final presentation at the Isaac Student Research Symposium before the French students go on to present in front of bankers and venture capitalists in their home country.

The participants are driven by these guiding principles which determine the success of their projects: discovery, creativity, sharing, and empowerment. This special partnership provides a unique opportunity to grow as an individual, a student, and an entrepreneur. The most valuable aspect of an exchange like this is the opportunity to become familiar with cultures from around the globe and to make lasting friendships. The business plans the student teams developed are described below on the following pages.





Business Plan Development: An International Partnership between the U.S.A. and France—Innov/Screens

MACKENZIE NOVAK, '15

Majors: Business and Organizations, Finance
Hometown: Waterford, Mich.

ANDREA WALLES, '15

Major: Economics and Management
Hometown: The Woodlands, Texas

NICOLAS DELTOMBE

Ecole supérieure de Vente
Major: Business

ARNAUD GUILLEMIN

Ecole supérieure de Vente
Major: Business

LAWRENCE LONCLE

Ecole supérieure de Vente
Major: Business

BENJAMIN PERON

Ecole supérieure de Vente
Major: Business

With collaboration, we have created an innovative business plan that will launch in the United States for our international joint venture, Innov/Screens. Our company is a digital signage firm that specializes in flexible LED technology. We provide unique displays for flagship storefront marketing. Our goal is to provide a marketing tool that will help promote the expertise, values, and product lines of any business, utilizing the best technology available. Market research and feasibility studies have been completed to determine the strength and competitiveness of our business proposal.

Business Plan Development: An International Partnership between the U.S.A. and France—Electronic Cigarette

ALEX DECKER, '15

Major: Economics and Management
Hometown: Pinckney, Mich.

JUSTIN FRAGNOLI, '14

Major: Economics and Management
Hometown: Troy, Mich.

CHRISTINA KHIM, '14

Major: Business and Organizations
Hometown: Battle Creek, Mich.

JULIEN BELLENGER

Ecole supérieure de Vente
Major: Business

GUILLAUME DUPUY

Ecole supérieure de Vente
Major: Business

CLEMENCE LENTIN

Ecole supérieure de Vente
Major: Business

PIERRE-MATTHIEU PLAZE

Ecole supérieure de Vente
Major: Business

As an international team, we took our venture to the electronic cigarette market. By taking the current market product and developing a similar product that was more convenient, user-friendly, and aesthetically pleasing, we were able to create the luxury electronic cigarette. As a team we conducted various levels of market research, manufacturing and operational feasibility studies, and brand development research, to create the most elite product in its class and the company behind it.

Business Plan Development: An International Partnership between the U.S.A. and France—SLG 3D Printing

ZACHARY FRANCIS, '15

Major: Business Marketing
Hometown: Madison Heights, Mich.

JONATHAN LIST, '14

Major: Economics and Management (Accounting)
Hometown: Farmington Hills, Mich.

ROSS MUNIGA, '15

Major: Accounting (CPA Track)
Hometown: The Woodlands, Texas

NABIL BENABDELKADER

Ecole supérieure de Vente
Major: Business

ZAINA KRAFAT

Ecole supérieure de Vente
Major: Business

RENE NGADI

Ecole supérieure de Vente
Major: Business

IDRIS SANHAJ

Ecole supérieure de Vente
Major: Business

After conducting marketing and brand development research, feasibility studies, and creating an overall business plan, we determined our goal at SLG 3D is to serve the industrial design industry with prototype and model creation utilizing 3D printing as a means for production. Our firm will consult with clients and take them through the entire process of design formulation, creation, and production of prototypes. Customer service and flexible design customization will be the cornerstones of our success in the young, but growing industry. These keys will be critical in differentiating ourselves from competitors. Our full-service, hands-on approach to prototyping is unique, and while it is primarily conducive to the needs of smaller design firms, we will consider expanding our market to larger firms in the future. We have a solid footing for the creation of SLG 3D, but we must continue to research and make informed decisions in order to successfully reach our potential of gaining financial support from investors. The only limit is the one you set yourself.

Business Plan Development: An International Partnership between the U.S.A. and France—Sail-Connect

BRENNAN ACKERMAN, '15

Major: Business and Organizations
Hometown: Charlevoix, Mich.

JACOB DAVIS, '15

Major: Business and Organizations
Hometown: Marshall, Mich.

DANNIE FOUNTAIN-JAGODZINSKI, '14

Major: Media and Marketing Management
Hometown: Lexington, Mich.

PHILIPPE AUBRIOT

Ecole supérieure de Vente
Major: Business

REMI BLOT

Ecole supérieure de Vente
Major: Business

QUENTIN DECROIX

Ecole supérieure de Vente
Major: Business

QUENTIN HABERT

Ecole supérieure de Vente
Major: Business

Based on extensive research in fields such as marketing, feasibility studies, and an overall business plan created with international counterparts, our goal at Sail-Connect is to provide a smart, automated security and maintenance system for recreational boats. This maintenance system monitors the vital processes to ensure the boat's mechanical upkeep, as well as providing security solutions

to issues that modern leisure-boat owners face regularly. Features include: 24/7 video surveillance, sensors imbedded in the engine to ensure mechanical integrity, mobile applications for easy access to this information, along with others. With our Sail-Connect system, we aim to provide the best quality onboard experience offered on the market today, allowing for direct system interaction whenever the customer pleases.

Business Plan Development: An International Partnership between the U.S.A. and France—FullFit

RICHARD ATKINS, '14

Major: Economics and Management (Accounting)
Hometown: West Bloomfield, Mich.

CAITLIN MCCLOREY, '15

Major: Economics and Management
Hometown: Wixom, Mich.

BRAD MELPOLDER, '14

Major: Economics and Management
Hometown: Hamilton, Mich.

ARNAUD CARNIELLI

Ecole supérieure de Vente
Major: Business

VINCENT CONCEDIEU

Ecole supérieure de Vente
Major: Business

LAUR DOUZOBEU

Ecole supérieure de Vente
Major: Business

AURELIEN FAKIR

Ecole supérieure de Vente
Major: Business

MEDHI SABITY

Ecole supérieure de Vente
Major: Business

Through marketing and brand development research, as well as feasibility studies in areas including technology and law, our international team has developed a business plan for a product called FullFit. FullFit is a wristband that records your fitness performance into a smartphone application that analyzes your individual health profile and past performance to give you your own personal workout regimen. Unlike other fitness accessories, FullFit measures your fitness activities more accurately and develops your specific personal workout. The main advantage of this personal trainer is that it goes wherever you do. FullFit works at home, at the gym, on vacation, and on business trips. It works according to your schedule, and whatever fits your lifestyle.



Foundation for Undergraduate Research, Scholarship, and Creative Activity (FURSCA)

The Foundation for Undergraduate Research, Scholarship, and Creative Activity (FURSCA) was established to promote and support student research, original scholarship, and creative efforts in all disciplines. Through a number of programs, taking place at all points in a student's career at Albion, FURSCA can help students pursue independent study in their areas of interest. Students work closely with a faculty mentor to develop and carry out research or other creative projects. Participation in such projects provides valuable experience beyond the scope of classroom work, and enhances a student's preparedness for future employment or graduate studies. Some examples of FURSCA programs are listed below.

Student Research Partners Program—Geared toward first-year students, this program pairs a student with a faculty mentor to work on a project related to the faculty member's research or creative area. Students gain hands-on experience with scholarship in a specific field, and may elect to continue during their sophomore year. Participation is selective, based on high academic achievement, and stipends are awarded.

Research Grants—Students may apply for funds to support research or other creative projects. Students must work closely with a faculty adviser; however, projects are not limited to any particular discipline. Grants may be awarded to pay for supplies, printing costs, subject payments, software, or other costs associated with completion of the project.

Travel Grants—Students may be awarded travel funds to help cover expenses associated with travel to attend professional meetings at which they will present the results of their research or creative projects.

Summer Research Fellowship Program—A select number of students may remain on campus during the summer, earning a stipend, to work on research or creative projects. In addition to working closely with a faculty adviser, students participate in weekly seminars with other students in the program.