

Elkin R. Isaac
Student Research Symposium
Albion College



2016



Albion College

2016 Elkin R. Isaac Student Research Symposium

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

Albion College | April 20-21, 2016

SCHEDULE OF EVENTS

Wednesday, April 20, 2016

7:30 p.m. Elkin R. Isaac Alumni Lecture: Mallory Brown, '08
"Lessons Learned from a Mud Hut: What Travel Has Taught Me"

Welcome: Mauri Ditzler, President
Speaker Introduction: Vicki Baker, Associate Professor
of Economics and Management

Towsley Lecture Hall/Norris Center 101

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

Thursday, April 21, 2016

9-10:15 a.m. Student Research Platform Presentations

Forum #1 Forum #3
Norris Center 100 Norris Center 102

Forum #2 Forum #4
Towsley Lecture Hall/ Norris Center 104
Norris Center 101

10:45 a.m. Honors Convocation
Goodrich Chapel

1:30-4 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: Morris Dees
"With Justice for All in a Changing America"

Welcome: Mauri Ditzler, President
Honorary Degree Presentation: Wesley Dick, Professor of History
Speaker Introduction: Alena Farooq, '18
Goodrich Chapel

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

Elkin R. Isaac Alumni Lecture



MALLORY BROWN, '08

On a post-college backpacking trip to Southeast Asia, Mallory Brown's eyes were opened to the needs of others and the realization that she had the resources and desire to address these needs in a profound and positive way.

In 2010, she founded World Clothes Line, an apparel company with a "Buy 1, Give 1" mission that matches every item sold with a

new item for someone in need. Since its launch, Brown has personally delivered new clothing in 17 countries.

Six years later, Brown is a successful social entrepreneur, worldwide adventure traveler, and international humanitarian. She is the first brand ambassador for CrowdRise, the largest crowdfunding platform for good. As director of the CrowdRise 24-Hour Impact Project, Brown runs flash fundraisers on the ground for various causes around the globe. In 2015, she raised more than \$80,000 with six 24-hour campaigns in six different countries for six different causes.

In 2016, Brown is extending her philanthropic reach with her personal brand, Travel Mal. As a consultancy, Travel Mal helps for-profit companies embrace innovative strategies for corporate giving. As a public speaker, Brown encourages the next generation to think globally and give back.

Most recently, Brown became a founding director of global non-profit Chefs4Kids. The company works with nationwide restaurants and food industry celebrities to organize and promote philanthropic events. As director of communications, Brown works with organization partners in Haiti, Honduras, and other developing countries.

Brown's efforts have been featured by NBC's *Today* show, *The New York Times*, *Crain's Detroit Business*, The Huffington Post, and *Ambassador* magazine. Her work has attracted corporate sponsorship from organizations such as Ford Motor Company, Moosejaw Mountaineering, Zappos, CreateMyTee, and Meijer. Brown shared her approach to philanthropy at TedxDetroit 2015 with a talk titled "How to Save the World Before You're 30."

Brown grew up in Farmington Hills, Michigan. At Albion, she was a double major in economics and management and French and was a member of the Carl A. Gerstacker Institute for Business and Management. In 2011, Brown received the College's Young Alumni Award.

Joseph S. Calvaruso Keynote Address



MORRIS DEES

As a young Southern lawyer and successful entrepreneur in the 1960s, Morris Dees embarked on a lifelong crusade for social justice. Dees and his law partner, Joe Levin, won lawsuits that desegregated recreational facilities, reapportioned the Alabama Legislature, integrated the Alabama state trooper force and reformed the state prison system.

These and other successes inspired Dees and Levin, along with civil rights activist Julian Bond, to found the Southern Poverty Law Center (SPLC) in 1971. Today the SPLC continues to play an integral role in shaping, defining and enforcing civil rights legislation throughout the country.

Currently serving as SPLC's chief trial attorney, Dees built a fearsome reputation for innovative lawsuits that crippled some of America's most notorious hate groups. One of Dees' victories bankrupted the Aryan Nations, and he has won multimillion-dollar judgments against the California-based White Aryan Resistance, the Carolina Klan, the United Klans of America and others.

Committed to prevention and education as much as prosecution, Dees and the SPLC created its Teaching Tolerance project, now in its 26th year. The program has been distributed free of charge to more than 80,000 public schools and two of its films have been excerpted from Oscar-winning documentaries.

Dees has received more than 20 honorary degrees and numerous awards, including Trial Lawyer of the Year from Trial Lawyers for Public Justice, the Martin Luther King Jr. Memorial Award from the National Education Association, and The Salem Award for Human Rights and Social Justice. He was named one of the Jaycees' Ten Outstanding Young Men of America for his early business success. He is a member of the American Trial Lawyers' Association Hall of Fame and holds an American Bar Association Medal, that organization's highest honor.

Dees was the subject of a 1991 NBC television movie, *Line of Fire*, about his prosecution of the United Klans of America on behalf of the mother of Michael Donald, a young man who was lynched in Mobile, Alabama. Wayne Rogers portrayed Dees in the 1996 feature film *Ghosts of Mississippi*, about the murder of civil rights worker Medgar Evers.

Dees has not confined his civil activism to the courtroom; he also served as finance director for former President Jimmy Carter's campaign in 1976 and for Democratic presidential nominee George McGovern in 1972.



Student Presentation Schedule | Thursday, April 21, 2016

FORUM #1 – NORRIS 100

9:00	Madeline Beattie (T. Lincoln)	Bioacoustics of <i>Pterois volitans</i>
9:15	Daniel Traub (Bartels)	A Description and Systematic Analysis of Eocene Basin-Center Crocodylids from the Green River Basin, Wyoming
9:30	Meredith Barton (Lyons-Sobaski)	A Global Perspective of the Population Genetics of Bottlenose Dolphins (<i>Tursiops truncatus</i>): The Importance for Conservation
9:45	Alice Lalone (Lyons-Sobaski)	Wet Meadow Restoration Analysis Using GIS Technology and Techniques
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1:30	William Hart Davis, Stephanie Thurner (Kennedy, White)	Effect of Parental Provisioning and iButton Color on Post-Fledgling Behavior of House Wrens (<i>Troglodytes aedon</i>)
1:45	Angela Walczyk, Elise Anderson (Lyons-Sobaski)	Testing the Novel Weapons Hypothesis: Does Spotted Knapweed (<i>Centaurea stoebe</i> Lam.) have an Allelopathic Impact?
2:00	Brandon Moretti (Rabquer)	Vanadium Complexes Inhibit Growth of HT-29 Cells via ROS Generation
2:15	Alyssa Wright (Olapade)	A Review of Porcine Epidemic Diarrhea Virus
2:30	Carleigh McMahon (Kennedy, White, Lyons-Sobaski)	The Effects of Ambient Noise on Nestling House Wrens (<i>Troglodytes aedon</i>): Response Rate to Parental Food Calls
2:45	Josh Gaudette (Rabquer)	MiR9 Is Increased in Rheumatoid Arthritis Monocytes and Regulates Monocyte Migration
3:00	Zac Barry (Rabquer)	MiR429 Is Upregulated in Inflammatory Monocytes and Regulates Monocyte Migration
3:15	Ross Kynast (Rabquer)	MiRNA Expression in Inflammatory Monocytes
3:30	Erik Brink (Saville)	Neuronal Proteasome Dysfunction and Motor Ability in <i>Drosophila Melanogaster</i>

FORUM #2 – TOWSLEY LECTURE HALL/NORRIS 101

9:00	Emma Stapley (Skean)	An Exploration of GMOs as a Means of Learning About Science Writing
9:15	Molly McCrum (Rabquer)	Childhood Vaccinations: the History, the Purpose, and the Policies
9:30	Matthew Kleinow (Ball)	A String Quartet Composition in Sonata Form
9:45	Sarah McDaniel (Palmer)	Unstuck: Exploring Musical Interpretations of Kurt Vonnegut's Literature

1:30	Austin Denha, Ethan Sutton (Reimann)	Algorithmic Stock Trading: Mathematical Strategies and Computational Implementation
1:45	Elena Luce (Carlson, Baker)	GAAP to IFRS Convergence: Catering to Investors by Embracing Change
2:00	Erica Willoughby (Keyes)	Planning and Implementing a Summer Camp: Teens Exploring Nature
2:15	Brandon Johnson (Wilson)	Habituation Learning in <i>Lumbricus terrestris</i>
2:30	Jessica McKindles (Francis, E. Hill)	It's Not About Being Male, It's Beliefs About What Being a Man Entails: The Relationship Between Gender, Gender Role Beliefs, Self-stigma, and Attitudes Toward Counseling
2:45	Justin Duchene (M. Hill)	The Netflix Effect: Examining the Impact of <i>Orange Is the New Black</i> on Attitudes Toward Transgender Characters
3:00	Justin Van Blaricom (Li)	The Work of John Maynard Keynes and Its Effect on Modern Public Policy
3:15	Austin McKee (Grossman)	Minimally Regulated Private Markets and Prospects for Organ Donation Policy
3:30	Laura Yurgalite (Erlandson)	Examination of Uses and Motivations of the Mobile App Tinder
3:45	Jessica Scott (Boyan)	NCAA Division I Athletic Departments' Social Media Policy Content: An Update to Sanderson

FORUM #3 – NORRIS 102

9:00	Pietro Geisler (Harris)	Progress Toward a Catalyzed Synthesis of Biphenyls from Phenylboronic Acid
9:15	Jordan Hempfling (McCaffrey)	Synthesis and Characterization of V ^{VO} ₂ (3-methoxysalicylaldehyde semicarbazone)
9:30	Corbin Livingston (Metz)	Developing a Sustainable Catalyst: Optimization of Palladium/Carbon Composite
9:45	Stephanie Norwood (Moreau)	Characterization of Chemical Mechanical Polishing of Thermal Oxide Coated <1, 0, 0> Silicon Wafers
10:00	Timothy Szocinski (Reimann)	Modulus Graphs with Applications to the Collatz Conjecture
1:30	Taylor Shell (Wickre, Feagin)	<i>An Exploration of Artistic Process Based on Personal Vulnerability</i>
1:45	Emma Stapley (Collar)	<i>Defining Entropy: Poems</i>
2:00	Christopher Herweyer (Sacks, MacInnes)	Impractical Peninsula: Attempts at Settling Northern Lower Michigan
2:15	Spencer Gust (Dick)	The Flint Water Crisis
2:30	Melanie Fodera (Deutsch)	Not My Rain Man: My Life with an Autistic Brother

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2:45	Corissa Detwiler (Boyan, Chytilo, Baker)	Makerspaces in Churches: Alignment Between Church and Makerspace Mission Statement Language Use
3:00	Audrey DeGroot (Feagin)	Beyond Dates: A Photographic Exploration of Albion's History
3:15	Kate Casebeer (MacInnes)	Animal Geography: Contributing to the Map of Early Modern London (MoEML)
3:30	Shenoa Butcher (Wickre)	A Land Once Mine
3:45	Ed Abranovich (Dick)	The 1932 Bonus Army March on Washington: Patriotic Americans or Communist Plot?

FORUM #4 – NORRIS 104

9:00	Theresa Hencsie, Natalie Krauss, Benjamin Amouch, Patrick Minh-Duc Bui, Romain Champaud, Sutharsan Ravindran, Bérengère Rees (Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership Between the USA and France – Soccer Strategies
9:15	Alena Farooq, Ryan Matynka, Megan Winkler, François Buvry, Ismail Douiri, Titouan Niault, Allan Ursulet (Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership Between the USA and France – SmartMask
9:30	Sarah Likens, Andrew Martin, Alexandre Delprat, Célestin Ghalyoun, Nisha Navathees, Mégane Trochet (Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership Between the USA and France – RunWatch
9:45	Marjori Boldt, Ben Kolanowski, Manon Chevallier, David Chantelose, Dorian Guillaume, Magali Vuillier (Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership Between the USA and France – Cultur'All

1:30	Abubakar Ishak (Harnish)	Confronting Global Warming: Policies and Practices in the United States, Japan, and Nigeria
1:45	Claudia Liu (Melzer)	Theoretical Synthesis of Poverty and Dehumanization
2:00	Alexandra Carey (Boyan)	Albion and Its Sister Cities: Communication Accommodation Theory and the Developmental Model for Intercultural Sensitivity Portrayed Through an International Partnership
2:15	Madeline Beattie (Walling)	Sovereignty in Kiribati: The State of the Kiribati Islands and Protecting the Phoenix Islands Protected Area in the Face of Climate Change
2:30	Mariah Phelps (Grossman)	German Geo-economic Power and NATO
2:45	Mitchell Moore (Walling)	U.N. Security Council Reform: Keeping International Peace and Security Within It
3:00	Mark Cardy (Yoshii)	Interest Groups in the European Union: A Convenient Solution to the Democratic Deficit?
3:15	Katrina Tooker (Walling)	Victims Within Justice, a New Perspective: Balancing Retributive and Restorative Justice Within the International Criminal Court

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

Michael Augugliaro (Bieler)	Design of an Instrument to Measure the Conductivity of Conductive Polypyrrole
Josh Boren (McRivette)	Quantifying the Emissions from Anthropogenic Burning in the Palouse, WA-ID
Jessica Bush (Rohlman)	Synthesis and Characterization of Nucleic Acid Aptamers Targeted at <i>Aspergillus</i> Surface Carbohydrates
Claudia Crake, Krista Watson (McCaffrey)	Reaction of Dihydroxyacetone and Glycoaldehyde with Prebiotically Relevant Minerals Under Aqueous Conditions
Michael Crinion (Betz)	The Influence of Music on Perceived Exertion During Exercise
Austin Denha, Kevin Clauncherty, Jack Lhamon, Robert Petersen (Moreau)	3D Printed Quad Copter: Pi Rho Epsilon 2015-2016 Student Projects
Emily Ebaugh (Bartels)	Eocene Dermatemydid Turtles from the Green River Basin, Wyoming
Margaux Kabodian (Baker)	Google AdWords Campaign
Courtney Kondor (Lewis)	Assessment and Design of Mobile Apps for Aiding Understanding of Molecular Structure
Tara Mahon (T. Lincoln)	Updating Albion College's Carbon Audit
Nicholas Mercado (McRivette)	Geologic Mapping of the Moon Using Remote Sensing Techniques: Moulton Crater
Shannon Murphy (Metz)	Coupling Reactions Catalyzed by Palladium/Carbon Composites
Alyssa Obert (McCaffrey)	Quantitative Water Testing Using API Kits
Lauren Pawelec (McRivette)	Mapping Tibetan Ultrahigh-Pressure Terranes Using Remote Sensing Techniques
Lauren Rasmussen (Olapade)	Determining the Optimal Metal Ion Concentration for Hydrolytic Enzyme Activities of Microbial Communities
Megan Sheridan (Rohlman)	Synthesis and Characterization of Ribonucleic Acid Aptamers Targeted at <i>Aspergillus</i> Cell Surface Carbohydrates
Andrew Strzelecki (Bieler)	Bromine Clathrate
Grace Talaski (Lewis)	Cloning and Expression of the Glucosamine-1-phosphate Deaminase Gene <i>NagB</i> from <i>Escheria coli</i> : Progress Toward Measuring Michaelis-Menten Kinetics for Phosphoglucosamine Mutase
Claire Wittkowski, Spencer Gust, Rachel Powell, (T. Lincoln)	Modeling Kalamazoo River Base Flow Recessions: A Window into Recharge Areas
Shuqi Zhou (Bollman)	Shifted Hecke Insertion and the K-theory of $OG(n, 2n+1)$

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(poster session continued)

- Jarrett Bochniak, Dominic Bona, Joshua Fischer, David Simon, David Van Ittersum (Baker) Management Consulting Projects – Caster Concepts
- Andrew Baldwin, Brad Bogus, Gabrielle Campos, Alyssa Ninkovich, Taylor Zuke (Baker) Management Consulting Projects - Humanergy
- Collin Ahrens, Cameron Clements, Shane Jackson, Brendan McClorey, Ashley Tice, Radouane Ziani (Baker) Management Consulting Projects – NuStep
- Aly Bates, Craig Keyes, Josh Massab, Robert Sommerville, Ryan Watson, Katie Zinkel (Baker) Management Consulting Projects – TNR Machine
- Marjori Boldt, Megan Britton, Tim Langholz, Paul Stewart, Allison Voorhess (Baker) Managing People and Organizations – Team 1
- Isabel Fontana, Rachel Hahn, Kadie Koolwick, Maisey Peterson, Olivia Savage, Jessica Scott (Baker) Managing People and Organizations – Team 2
- Cameron Clements, Harry Cooney, Nathan Dirado, Paul Johnson (Baker) Managing People and Organizations – Team 3
- Andrew Baldwin, Andrew Byrne, Marius Froehlich, Sy Riddell, Hannah Tolles (Baker) Managing People and Organizations – Team 4
- Jack Brownlow, Tyler Covell, David Goslin, Jared Larr, Jordan Stinchcomb (Baker) Managing People and Organizations – Team 5
- Caroline Adamczyk, McKenzie Bueck, Damon Eldridge, Alyssa Hendricks, Ryan Watson, (Baker) Managing People and Organizations – Team 6

Abstracts of Student Presentations



ED ABRANOVICH, '16 **The 1932 Bonus Army March on Washington: Patriotic Americans or Communist Plot?**

Faculty Sponsor: Wesley Dick
Majors: History, Religious Studies
Hometown: Canton, Mich.

In April 1917, the United States declared war against Germany and entered World War I. For Americans, this was “the war to end all wars” and “the war to make the world safe for democracy.” Patriotic fervor surrounded the American Expeditionary Force (AEF) sent “over there.” The American GIs tipped the balance for an Allied victory over Germany in 1918. American soldiers came home to Victory Parades. However, the cheering soon stopped and it was 1924 before Congress passed the World War Veterans Act that compensated those who had served. Referred to as a bonus by advocates, it was actually “a twenty-one-year endowed life insurance policy payable at death or in 1945, whichever came first.” Amid the noise of the “Roaring Twenties,” the veterans’ “Tombstone Bonus” might have been forgotten if the stock market had not crashed in 1929, ushering in the Great Depression of the 1930s. Twenty-five percent of Americans were out of work and without a safety net. Contingents of veterans from all over America marched on the nation’s capital to petition the government for the immediate payment of their bonus. Veterans occupied abandoned downtown Washington, D.C. buildings and brought their wives and children, creating the nation’s most famous Hooverville in the Anacostia River flood plain. They called themselves the Bonus Expeditionary Force (BEF).

Instead of facilitating the bonus, the government responded by sending the U.S. Army on horseback and in tanks to drive the veterans out of Washington. Was this any way to treat America’s veterans? This study explores the actions of the Hoover Administration and the legacy of the 1932 Bonus Army.

CAROLINE ADAMCZYK, '17

(See Managing People and Organizations Projects)

COLLIN AHRENS, '16

(See Management Consulting Projects—NuStep)

ELISE ANDERSON, '17

(See Angela Walczyk, '16, Elise Anderson, '17)



MICHAEL AUGUGLIARO, '17 **Design of an Instrument to Measure the Conductivity of Conductive Polypyrrole**

Faculty Sponsor: Craig Bieler
Majors: Chemistry, Physics
Hometown: Washington Township, Mich.

The use of four-point probe devices, also known as four-terminal sensing, is a common technique in determining the resistivity of thin film semiconductors. Four-point probe devices are often sold as “black boxes” but can also be easily made with simple materials. They are usually built by connecting platinum wires with silver paste to a thin film sample, and then measuring the voltage across and current through the sample. However, a recent paper by Seng and coworkers (*J. Chem. Edu.* 2014, 91, 1971–1975) provides instructions on how to build a simple four-point probe device out of common materials such as recyclable plastic, Scotch tape, digital multimeters, a power supply, and beryllium-copper wire. The goals of this project are to replicate and improve upon their design by building the device described in their paper and test its effectiveness by measuring the conductivity of conductive polypyrrole which will be synthesized using electropolymerization techniques. The device will be standardized using a thin film with known conductivity such as stainless steel or copper, and the conductivities of polypyrrole will be calibrated against these standard values. This project should provide a way to effectively and inexpensively measure the conductivity of thin films and maximize the conductivity of conductive polymers.

Supported by: FURSCA

ANDREW BALDWIN, '16

(See Management Consulting Projects—Humanergy)

ANDREW BALDWIN, '16

(See Managing People and Organizations Projects)



ZAC BARRY, '16
MiR429 is Upregulated in Inflammatory Monocytes and Regulates Monocyte Migration

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

Rheumatoid Arthritis (RA) is an autoimmune disease characterized by chronic inflammation and joint destruction. Inflammation is characteristic of an immune response, brought about by increased migration of leukocytes to the damaged area. Monocytes migrate from the blood into the tissue to exert their effects. A multitude of genes involved in inflammatory pathways regulate monocyte migration. MiRNAs are post transcriptional regulators that effect gene expression in a variety of cell types and in response to various stimuli. We hypothesized that inflammation regulates miRNA expression, including miR429, which then plays a specific role in regulating the expression of monocyte genes involved in monocyte migration.

Monocytes were isolated from the blood of normal subjects (n=5) and patients with RA (n=8). miRNA was isolated and cDNA prepared. qPCR was performed using primers specific for miR429. There was a 2.6 fold increase in the expression of miR429 in the RA patients compared to the normal subjects. The miRNA databases, miRanda and MiRwalk, were used to identify gene targets for miR429 that are involved in monocyte and inflammation pathways. This analysis identified 38 gene targets with possible relevance to monocyte inflammatory processes, including MAP4K4, PIKfyve, and PAK2. MiR429 mimics and inhibitors were then used to assess the role of miR429 in regulating gene expression and migration. After confirming mimic and inhibitor specificity and efficiency in U937 monocytes, we found miR429 had an effect on PAK2 expression. The mimic reduced the expression of PAK2 by a fold change of 0.57, and the inhibitor increased the expression of PAK2 by a fold change of 28.6. Chemotaxis was performed to test the effect of miR429 on monocyte migration in response to monocyte chemoattractant protein (MCP-1). The miR429 mimic-treated U937 cells (n=11 replicates) had similar migration to MCP-1 when compared to control cells treated with only transfection reagent (n=10). However, migration was decreased by 47% in U937 cells treated with the miR429 inhibitor (n=10 replicates) compared to the control.

Our results suggest miR429 is upregulated in RA monocytes, and that miR429 plays a role in monocyte migration by regulating genes such as the cytoskeletal regulator, PAK2.

Supported by: FURSCA



MEREDITH BARTON, '16
A Global Perspective of the Population Genetics of Bottlenose Dolphins (*Tursiops truncatus*): The Importance for Conservation

Faculty Sponsor: Sheila Lyons-Sobaski
 Major: Biology
 Hometown: Canton, Mich.

Bottlenose dolphins (*Tursiops truncatus*), live in oceans all over the world, from temperate to tropical, coastal to open waters, and everywhere in between. There are many populations of the species, and thus the species as a whole is not considered to be threatened or endangered with extinction. However, some populations appear to be more susceptible to environmental changes, potentially leading to their demise. These changes can occur as a result of climate change, chemical pollutants, and human interactions such as dolphin watching or recreational water sports. The exact number of populations is up for debate, but researchers agree that genetic differences exist between populations. Select populations contain unique alleles, and by protecting the individual populations, the overall genetic diversity of the species may be safeguarded. Collectively, these genetic differences are important to the global conservation of the species. The more genetically diverse the species is, the better it can respond to both natural and human-induced environmental changes.

ALY BATES, '16

(See Management Consulting Projects—TNR Machine)



MADLINE BEATTIE, '17
Bioacoustics of *Pterois volitans*

Faculty Sponsor: Tim Lincoln
 Majors: Political Science, Environmental Science
 Hometown: Mount Prospect, Ill.

Invasive lionfish (*Pterois volitans/miles*) are a member of the Scorpaenidae family native to the Indo-Pacific region. There has been little research to date on the acoustic capabilities of this species, despite reports of vocalization during capture. Through the analysis of acoustic recordings of captive lionfish, this study has established that the species is capable of producing unique vocalizations. Vocalizations were recorded with single fish and multiple fish in a tank that were sometimes agitated to induce sound production. The analysis revealed several distinct vocalization types, including a repetitive knock and a hum. A noticeable variation in the vocalizations recorded occurred with a single fish present versus multiple fish. In addition, undisturbed calls were recorded outside of the trial periods, indicating that vocalizations are likely to be part of the natural behavior of *Pterois volitans*.

This study provides the foundation for further research into the acoustic capabilities of lionfish, including research into the role of vocalizations in their social behavior and the possibility of acoustic monitoring as a way to manage the invasive population.

Supported by: Duke University, U.S. National Oceanic and Atmospheric Administration



MADELINE BEATTIE, '17
Sovereignty in Kiribati: The State of the Kiribati Islands and Protecting the Phoenix Islands Protected Area in the Face of Climate Change

Faculty Sponsor: Carrie Booth Walling
 Majors: Political Science, Environmental Science
 Hometown: Mount Prospect, Ill.

The Phoenix Islands Protected Area—a large-scale marine protected area located in the central Pacific—may disappear within our lifetime. Its existence is closely tied to the stability of the Kiribati state. As sea levels rise, climate change is likely to create conditions incompatible with Kiribati remaining a sovereign state under current international law. The very existence of the Kiribati state is at risk as it loses its territory to the sea. Once Kiribati is no longer considered a state, it will then lose ownership over its maritime zones, including its economic zone which grants Kiribati exclusive rights to the resources within 200 nautical miles of its borders. The Phoenix Islands Protected Area derives the bulk of its legitimacy from its location within Kiribati's exclusive economic zone and, under the current management plan, will likely dissolve in the event that Kiribati loses its autonomy over this area. This presentation will present several solutions to assure the continued existence of the Phoenix Islands Protected Area regardless of the future of Kiribati's state sovereignty. The solutions were designed with the primary goal of conserving the Phoenix Islands Protected Area, Kiribati's significant achievement in the field of marine conservation.

Supported by: SEA Education Association

JARRETT BOCHNIAK, '16

(See Management Consulting Projects—Caster Concepts)

BRAD BOGUS, '16

(See Management Consulting Projects—Humanergy)

MARJORI BOLDT, '18

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—Cultur'All)

MARJORI BOLDT, '18

(See Managing People and Organizations Projects)

DOMINIC BONA, '16

(See Management Consulting Projects—Caster Concepts)



JOSH BOREN, '16
Quantifying the Emissions from Anthropogenic Burning in the Palouse, WA-ID

Faculty Sponsor: Michael McRivette
 Major: Geology
 Hometown: Ann Arbor, Mich.

The Palouse is a major agricultural region in inland Washington-Idaho. Widely cultivated crops include wheat, barley, lentils, and chick peas; burning of the crop residue is a common practice here in spring and fall. The anthropogenic burning practices on this large a scale can potentially contribute considerable amounts of greenhouse gases as well as other materials to the atmosphere. Prior research of this subject has only been analyzed as part of a national-scale and low-resolution study. The process of estimating the quantity of atmospheric emissions produced by crop residue burning after the 2015 harvest season in the Palouse include the multiple phases of analyzing moderate-resolution and multispectral Landsat 7 and 8 imagery in Envi Software and performing emission calculations. The multiphase processes in image analysis includes determining burned area based on NIR and SWIR reflectances. Crop type is determined by differences in NIR values with information from the US Department of Agriculture's Cropland Data Layer.

From comparing multiple images of before and after the time of anthropogenic burning and using ENVI image analysis software to produce maps showing burned areas and crop distribution, the burned areas are mapped by calculating the differenced normalized burn ratio (DNBR). Estimates of carbon monoxide (CO), carbon dioxide (CO₂), methane (CH₄), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂) produced by crop residue burning in the Palouse are then calculated by combining the image-derived areas of burning with published emission parameters for the various crops identified in the crop type analysis. These methods allow for better estimation of emissions from the anthropogenic burning in the Palouse due to the higher spatial resolution, and are thus more precise than previous studies in the area.



These methods can be replicated using spatial data of other similar regions to more accurately assess the overall contribution of these practices to atmospheric concentrations of greenhouse and other gases.



ERIK BRINK, '16
Neuronal Proteasome Dysfunction and Motor Ability in *Drosophila Melanogaster*

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

The ubiquitin-proteasome system is a biological mechanism by which misfolded proteins can be degraded by the cell. Impairments of this system may have a role in a number of conditions with degenerative motor phenotypes, notably Parkinson's disease. In this study, I expressed a conditional proteasome knockout mutation in dopaminergic neurons to study the effects of proteasome dysfunction on motor ability in the fruit fly, *Drosophila melanogaster*. I found that flies with their proteasomes rendered inactive by the mutation showed a time-dependent decline in their motor function, and that this decline was more severe than in either control flies which did not express the mutation, or in flies with the mutation where it was not activated. This has implications for the function of the proteasome in neurodegenerative conditions such as Parkinson's disease, and further studies must be carried out to associate proteasomal dysfunction with neurodegeneration.

Supported by: FURSCA, Biology Department

MEGAN BRITTON, '17

(See Managing People and Organizations Projects)

JACK BROWNLOW, '17

(See Managing People and Organizations Projects)

McKENZIE BUECK, '17

(See Managing People and Organizations Projects)



JESSICA BUSH, '18
Synthesis and Characterization of Nucleic Acid Aptamers Targeted at *Aspergillus* Surface Carbohydrates

Faculty Sponsor: Christopher Rohlman
 Majors: Chemistry, Biology
 Hometown: Marshall, Mich.

Aspergillus is a common fungus that is found naturally throughout the world. Of the 200 known species of *Aspergillus*, 16 have been identified as being harmful to

humans and other animals. These spores are inhaled on a daily basis and processed within the body without any negative consequences, however prolonged exposure to high quantities of *Aspergillus* can cause allergic symptoms, toxic symptoms, and infection (Hummel et al., 2006). People at highest risk are those with weakened immune systems such as surgery, HIV/AIDS, and cancer patients. Traditional methods for the detection of *Aspergillus* infection in the body are difficult and invasive, including biopsies of cerebral lesions and extraction of cerebrospinal fluid, and frequently yield negative results (Hummel et al., 2006). These detection methods are often not feasible for immune-compromised patients.

Aptamers present a new potential detection method for Aspergillosis. Aptamers are single-stranded DNA or RNA sequences, which bind to a target molecule with high affinity and specificity (Navani et al., 2009). These sequences can be selected to bind to ligands associated with Aspergillosis. Because aptamers have the capacity to bind target molecules with high affinity and specificity, they have become a common diagnostic and therapeutic tool. In research, aptamers can have several applications such as artificial gene synthesis, DNA sequencing, library construction, molecular probes, and polymerase chain reaction (McKeague and DeRose, 2012). Such application allows us to target and identify a wide variety of infectious diseases, including fungal infections caused by the mold *Aspergillus*. By selecting for specific nucleic acid aptamers, we can develop a new detection method for Aspergillosis that is more sensitive and less invasive. Once selected, fluorescent tagging can be used to observe their interaction with the target molecule.

The design of this experiment was to develop a method for selecting aptamers that bind to a variety of carbohydrates that can be found on the cell surface of *Aspergillus*. As a means for developing and evaluating the selection process, several carbohydrate targets were studied. This selection process binds randomized nucleic acid cassettes to a target carbohydrate found on the *Aspergillus* surface. Once bound, a washing process is used to eliminate DNA sequences that did not tightly bind to the carbohydrate. Nucleic acid sequences that do bind are then eluted and isolated to select successful aptamer candidates. Asymmetric PCR is then used to convert the double-stranded DNA into the single-stranded DNA that will be used as a pool for the next round of selection. Several rounds of selection were completed in which the nucleic acid pool was significantly refined. We are currently characterizing the aptamer binding interaction with *Aspergillus*.

Supported by: FURSCA

**SHENOA BUTCHER, '16****A Land Once Mine**

Faculty Sponsor: Bille Wickre
Majors: Art, English (Creative Writing)
Hometown: Coldwater, Mich.

"A Land Once Mine" is a documentation of my own personal journey through years of being a sexual assault survivor. My writing and art start with an exploration of trauma and its effect on an individual. My poetry focuses on the act of survival and living beyond the event, while my paintings explore the condition of inhabiting the body upon which the trauma was enacted. I use paint as the medium to express how grief and memory dredge and layer into the skin, creating imagery that is both figure and landscape. Through the creation of this body of work, I hope to move from the experience of one individual to a more universal statement of survival and triumph.

ANDREW BYRNE, '16

(See Managing People and Organizations Projects)

GABRIELLE CAMPOS, '17

(See Management Consulting Projects—Humanergy)

**MARK CARDY, '16****Interest Groups in the European Union: A Convenient Solution to the Democratic Deficit?**

Faculty Sponsor: Midori Yoshii
Majors: French, International Studies
Hometown: St. Clair Shores, Mich.

This research demonstrates the ambiguous function of interest groups in the European Union (EU). Interest groups, particularly corporate interests with privileged access to the EU, exert significant influence on the legislative process, allowing little transparency in their actions. As a result, 60 percent of Europeans think their voices do not count and only 39 percent positively approve of the EU. Despite the obvious importance of democracy in EU politics, the EU does not place priority on the issue of transparency in the current legislative process. This paper identifies three reasons for this neglect: 1) The EU faces more urgent issues such as the refugee and Euro crises; 2) Interest groups provide expertise necessary for the understaffed EU bureaucracy to draft legislation; 3) Interest groups themselves lobby against transparency measures. In summation, these reasons demonstrate that interest groups take advantage of the limited EU bureaucracy. Although some scholars argue that interest groups allow citizens greater voice by acting as direct representatives, this research challenges

such optimistic interpretations through examination of official EU documents. In conclusion, increased awareness and demand among EU citizens for enhanced transparency measures and expansion of the internal expertise of the EU institutions constitutes an effective means to solve this issue.

**ALEXANDRA CAREY, '16****Albion and Its Sister Cities: Communication Accommodation Theory and the Developmental Model for Intercultural Sensitivity Portrayed Through an International Partnership**

Faculty Sponsor: Andy Boyan
Major: Communication Studies
Hometown: Birmingham, Mich.

The Noisy-le-Roi/Bailly and Albion partnership is somewhat anomalous in that the participants form deep and lasting relationships among members of different cultures. This partnership will be evaluated in terms of intercultural communication and communication accommodation theory. Data will be presented that uses intercultural communication theories as a framework in an effort to determine how these strong relationships came to be. Giving a complete history of the partnership that started in 1997 along with quotes and first-person accounts, this thesis will attempt to explain why this sisterhood, or *jumelage* in French, is existing and thriving, and also vital to each city.

**KATE CASEBEER, '17****Animal Geography: Contributing to the Map of Early Modern London (MoEML)**

Faculty Sponsor: Ian MacInnes
Majors: Chemistry, English
Hometown: Pleasant Lake, Mich.

Last summer I had the opportunity to work as a contributor to the Map of Early Modern London (MoEML), an interactive online map of Elizabethan London based on a digitized version woodcut map from 1561. I researched assigned sites on the map using original documents and papers to compose an article. MoEML offers a virtual workshop to train contributors to encode in TEI (Text Encoding Initiative). Through this training I was able to encode one of the articles I wrote. In my presentation I will discuss the research process, some of the difficulties that have arisen in it, and the process of composing and encoding an article for MoEML.

Supported by: FURSCA



KEVIN CLAUCHERTY, '17

(See Austin Denha, '17, Kevin Claucherty, '17, Jack Lhamon, '17, Robert Petersen, '18)

CAMERON CLEMENTS, '17

(See Management Consulting Projects—NuStep)

CAMERON CLEMENTS, '17

(See Managing People and Organizations Projects)

HARRY COONEY, '16

(See Managing People and Organizations Projects)

TYLER COVELL, '16

(See Managing People and Organizations Projects)

in the presence and absence of water. In this poster, preliminary results will be presented on the reaction of DHA and GLA with montmorillonite clays and other relevant minerals under aqueous conditions. If time permits, results of simulated impact experiments in the presence of water will be presented.

Supported by: FURSCA



MICHAEL CRINION, '16

The Influence of Music on Perceived Exertion During Exercise

Faculty Sponsor: Heather Betz
Majors: Exercise Science, Music
Hometown: Jenison, Mich.

The influence of music on exercise performance, physical measures, and perceived exertion has been studied with inconsistent results. Yamashita, Iwai, Akimoto, Sugawara, and Kono (2006) tested the effects of music on ratings of perceived exertion (RPE) during cycle ergometer testing at low and moderate intensities. Relative to the control condition, the music reduced RPE at the low but not the moderate exercise intensity. However, other studies have reported a strong influence of music at moderate exercise intensities (Potteiger, Schroeder, & Goff, 2000; Szmedra & Bacharach, 1998). In contrast, Dyrland and Wininger (2008) examined the effects of preferred and non-preferred music during 20 minutes of treadmill exercise at low, moderate and high intensity levels. The music conditions did not elicit any clear effect on either RPE or enjoyment levels. A study by Lin and Lu (2012) examined both auditory and visual stimuli (together and separate) on physical performance and RPE during a 12-minute cycle test. They found that neither stimuli produced a change in heart rate, but there were differences between all three stimuli conditions (music only, video only, both music and video) in terms of physical performance (distance covered) and RPE. Also, music reduced RPE to a greater effect than video stimuli. The purpose of this study is to examine the impact of different music conditions (control, classical, and personal choice) on heart rate, distance traveled, and RPE in college athletes who are exercising on a cycle ergometer (stationary bike).



Crake

CLAUDIA CRAKE, '17

Major: Chemistry
Hometown: West Bloomfield, Mich.

KRISTA WATSON, '17

Major: Chemistry
Hometown: Bangor, Mich.

Reaction of Dihydroxyacetone and Glycoaldehyde with Prebiotically Relevant Minerals under Aqueous Conditions

Faculty Sponsor: Vanessa McCaffrey



Watson

The Murchison Meteorite contains many complex organic compounds. In addition to polyaromatic hydrocarbons, nucleobases and amino acids, many sugar-like compounds have been discovered in this meteorite. These compounds could have been formed in situ while the meteorite was still in space, and some could have

been altered in the impact as the meteorite impacted the surface of the Earth. We have been interested in the formation mechanisms of the sugar and sugar derivatives and have worked to understand how these compounds could have formed and or been altered in simulated impact experiments. To this point, experiments have only been run under dry conditions, by mixing the sugar dihydroxyacetone (DHA) and the sugar precursor glycolaldehyde (GLA) with montmorillonite clay. However, it is known that Murchison and other meteorites of its class have experienced large amounts of aqueous alteration. This project looks to understand the difference in reactivity of DHA and GLA over prebiotically relevant minerals



Davis

WILLIAM HART DAVIS, '16

Major: Biology
Hometown: Albion, Mich.

STEPHANIE THURNER, '17

Majors: Biology, Mathematics
Hometown: Caledonia, Mich.



Thurner

Effect of Parental Provisioning and iButton Color on Post-Fledgling Behavior of House Wrens (*Troglodytes aedon*)

Faculty Sponsors: E. Dale Kennedy, Douglas White

The post-fledgling period (after young birds leave the nest and before they become independent) is understudied in songbirds. We need more knowledge of this period to better estimate avian reproductive success and to improve our understanding of population biology in songbirds. In summer 2015 we monitored adult feeding of nestling House Wrens and behavior of young wrens after they fledged to determine if there is a correlation between parental provisioning and post-fledgling behavior. We hypothesized that nestlings fed by both parents would be healthier, allowing them to travel a greater distance. We observed parental feeding, weighed and measured nestlings, and followed the fledglings after they left the nest. We were able to follow young from some nests for an average of 26 days after fledging. We found that parental feeding rates did not have a significant effect on fledgling health, or distance traveled. We also examined whether the color of an iButton, a temperature data logger, in the nest during the egg period affected feeding patterns of adult wrens. We hypothesized that color of the iButton will affect feeding patterns of parental wrens, with males more likely to feed at nests with white buttons than with brown buttons. After testing, we found that iButton treatment did not significantly predict male feeding rates.

Supported by: FURSCA



AUDREY DEGROOT, '16
Beyond Dates: A Photographic Exploration of Albion's History

Faculty Sponsor: Ashley Feagin
Majors: English, Art
Hometown: Dansville, Mich.

My research is based primarily in photography and its historical origins.

During my summer 2014 FURSCA research project, I discovered more than 200 glass negatives in the College Archives. I researched and identified the people and places in the images, and contact-printed each one using historic, manual techniques. This work solidified my fascination with alternative process, a

subgenre of photography. During the summer of 2015, FURSCA and I set out again, this time to conquer the wet plate collodion method. I had to master a large format, monorail camera and a huge tripod. I also had to teach myself how to work with the temperamental chemicals needed to create portraits on glass. With the help of many local sitters, and a lot of trial and error, I created a body of work that recalls the piercing gaze of the nineteenth-century camera. The number of photographers across the world who still utilize this process is small and I hope that my contributions will help keep this process and others like it alive.

Supported by: FURSCA



Denha

AUSTIN DENHA, '17

Major: Dual-Degree Program in Engineering
Hometown: Rochester Hills, Mich.



Claucherty

KEVIN CLAUCHERTY, '18

Major: Dual-Degree Program in Engineering
Hometown: Albion, Mich.



Lhamon

JACK LHAMON, '18

Major: Dual-Degree Program in Engineering
Hometown: Traverse City, Mich.



Petersen

ROBERT PETERSEN, '19

Major: Dual-Degree Program in Engineering
Hometown: Ann Arbor, Mich.

3D Printed Quad Copter: Pi Rho Epsilon 2015-2016 Student Projects

Faculty Sponsor: Charles Moreau

Over the past year, members of the Albion College engineering fraternity, Pi Rho Epsilon, have built a fully functional quad copter with video recording and real-time video display goggles. Construction of the quad copter utilized the club's 3D printer and was supported by Student Senate and the Department of Physics. In this poster the club will discuss the project and others currently under way; including construction of an arcade-style game console.

Supported by: Department of Physics; Student Senate



Denha

AUSTIN DENHA, '17

Major: Dual-Degree Program in Engineering
Hometown: Rochester Hills, Mich.

ETHAN SUTTON, '17

Major: Economics and Management
Hometown: Hastings, Mich.



Sutton

Algorithmic Stock Trading: Mathematical Strategies and Computational Implementation

Faculty Sponsor: David Reimann

As of 2014, about 84 percent of stock trades were automated by computers. Algorithmic trading of securities continues to grow in popularity due to increases in the collection of data, market access, and computing power. In this talk, we will walk through the basics of algorithmic trading as well as the process of building a simple

trading algorithm using mathematical analysis and programming concepts. We will explore variations of different strategies including mean reversion and pairs trading. We will examine the challenges of testing these algorithms against historical data. The discussion will also include a look at why successful strategies do not last indefinitely. Our attendance at algorithmic trading conferences in Chicago, Princeton, and New York City laid a solid foundation for our research. We will conclude the talk with the analysis of a trading algorithm we have designed and tested.

Supported by: Department of Mathematics and Computer Science; Department of Economics and Management; Student Senate

makerspaces, investigating language used in their mission statements, specifically asking if the practice of the makerspace aligns with the mission statement. Church makerspaces' mission statements may state they are welcoming and inclusive, but community members not affiliated with the church may either feel welcome or unwelcome according to the language makerspace members from the church use in a variety of formats on a daily basis, such as press releases, editorials, and public speeches. I am conducting interviews with a diverse group of individuals of various religious affiliations in order to decode their language use according to the makerspace's mission statement. Language use affects church makerspace interpersonal interaction and influences which potential members are more likely to join.

Supported by: FURSCA

NATHAN DIRADO, '17

(See Managing People and Organizations Projects)



JUSTIN DUCHENE, '16

The Netflix Effect: Examining the Impact of *Orange Is the New Black* on Attitudes Toward Transgender Characters

Faculty Sponsor: Megan Hill
Major: Communication Studies
Hometown: St. Clair, Mich.

Transgendered issues in the United States have come to the forefront of equality movements in recent months. With celebrities like Laverne Cox (*Orange Is the New Black*) and Caitlyn Jenner (*I Am Cait*), transgendered inequality has finally been addressed by the media, and the issue of transgendered equality is getting the platform it needs. This platform directly influenced my research, which is based on a 2005 study conducted by Schiappa, Gregg, and Hewes, who attempted to determine whether viewing gay characters in the televised show *Six Feet Under* had any effect on viewers' self-reported levels of prejudice. Using Parasocial Contact theory, this study observed peoples' attitudes as they were exposed to televised media, finding a positive correlation between exposure to media with gay characters and decreasing levels of prejudice toward this minority group. My research aims to mimic this study, but instead, gauges prejudice toward transgendered individuals. A post-test only randomized experimental design was employed in order to assess the influence of viewing a clip from the Netflix original series *Orange Is the New Black* on perceptions of transgendered individuals.



CORISSA DETWILER, '16

Makerspaces in Churches: Alignment Between Church and Makerspace Mission Statement Language Use

Faculty Sponsors: Andy Boyan, Lynne Chytilo, Vicki Baker
Majors: Art, Communication Studies
Hometown: Adrian, Mich.

I define makerspaces as do-it-yourself spaces where people can gather to create, invent, and learn in a creative environment. Makerspaces take various forms and work with a variety of people; those in churches provide a social gathering area for church members, although they are generally open to the community. My hypothesis has not yet been researched, so I am looking at media reports about makerspaces in churches, how makerspaces affect social environments, and how to properly set up and decode information gathered by interviews. This research is important because makerspaces are becoming increasingly popular and they affect people from many different backgrounds. This study focuses on church



EMILY EBAUGH, '16
Eocene Dermatemydid Turtles from the Green River Basin, Wyoming

Faculty Sponsor: William Bartels
 Major: Geology
 Hometown: Huntington Woods, Mich.

This study describes fossil turtles of the Family Dermatemydidae from the Eocene of Wyoming. Specimens were collected from the alluvial fan and meandering stream deposits of the Wasatch Formation and meandering stream and lake-margin deposits of the overlying Bridger Formation.

Dermatemydids are herbivorous, nocturnal river turtles that survive today as a single species in Central America, which is critically endangered due to human hunting.

There are four described Eocene dermatemydid species. *Baptemys tricarinata* and *Baptemys (Notomorpha) garmanii* have lateral carinae and an elongate entoplastron. *B. tricarinata* has two suprapygals, but the number of suprapygals in *B. garmanii* is unknown. *Baptemys wyomingensis* and *Baptemys fluviatilis* lack lateral carinae, but *B. wyomingensis* has three suprapygals and a triangular entoplastron, whereas *B. fluviatilis* has two suprapygals and a circular entoplastron.

Some previously described characteristics of *Baptemys* species are not confirmed by my specimens. The entoplastron is always teardrop-shaped and the number of suprapygals is variable. The presence of lateral carinae and crenulations, along with the placement of the gulo-humeral sulcus on the entoplastron, appear to be reliable differentiating characteristics. As others have suggested, *B. tricarinata* and *B. garmanii* are likely synonymous, as are *B. wyomingensis* and *B. fluviatilis*. We see no evidence for the separation of *B. garmanii* into the genus *Notomorpha*.

B. garmanii and *B. tricarinata* were considered to be Wasatchian species while *B. wyomingensis* (and *B. fluviatilis*) was known only from the younger Bridgerian. The specimens in my study indicate that *B. garmanii* (and *B. tricarinata*) also occur in the Bridgerian.

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

DAMON ELDRIDGE, '16

(See Managing People and Organizations Projects)

ALENA FAROOQ, '18

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—SmartMask)

JOSHUA FISCHER, '16

(See Management Consulting Projects—Caster Concepts)



MELANIE FODERA, '16
Not My Rain Man: My Life with an Autistic Brother

Faculty Sponsor: Glenn Deutsch
 Major: Communication Studies
 Hometown: Troy, Mich.

My project, titled *Not My Rain Man: My Life with an Autistic Brother*, started as a

FURSCA project (then titled *Finding the Missing Puzzle Piece*) in the summer of 2015. That summer, I completed first drafts of several short essays and began several more about my autistic brother, Johnny, and myself throughout our separate but parallel lives together: the good, the bad, the ugly, the confusing, the hilarious, the heartbreaking, and the just plain unexplainable. Since we are only one year and two months apart, I can scarcely remember life without him. Over the summer, I was able to interview Johnny's speech therapist, psychiatrists, teachers, and other adults who have played a role in his life about their experience with him and their views on autism in the modern world. For my thesis, I revised and further incorporated research into several of these essays. My thesis ultimately consists of four standalone essays that I hope to someday publish in literary magazines or anthologies, and then someday work into a full-length memoir. My greatest goal is that all of these stories make readers think about how we treat people who aren't neurotypical. I want everyone to understand that Johnny has been the farthest thing from a burden in my life, and that people with disabilities are as important as anyone else.

Supported by: FURSCA

ISABEL FONTANA, '16

(See Managing People and Organizations Projects)

MARIUS FROEHLICH, '16

(See Managing People and Organizations Projects)



JOSH GAUDETTE, '16
MiR9 Is Increased in Rheumatoid Arthritis Monocytes and Regulates Monocyte Migration

Faculty Sponsor: Bradley Rabquer
Major: Biochemistry
Hometown: Grosse Ile, Mich.

Rheumatoid Arthritis (RA) is characterized by inflammation. Monocytes, a key leukocyte in inflammation, migrate from blood to tissues where they differentiate into Macrophages. MicroRNA (miRNA), noncoding regions of RNA, act as regulators of gene expression. We have previously shown that miR9 is upregulated in THP1 monocytes TNF α stimulation. We hypothesize that miR9 is upregulated in RA monocytes, and regulates monocyte migration.

Monocytes were isolated from blood of patients with RA (N=3) and normal subjects (N=6). MiRNA was isolated, cDNA was prepared, and qPCR was performed using primers specific to miR9. miR9 was significantly upregulated in RA monocytes by 2.3 fold compared to normal monocytes (P < 0.05). We searched for miR9 gene targets using several databases. Suppressor of cytokine signaling 4 (SOCS 4) was chosen for further study because it showed the highest likelihood for miRNA binding. An inhibitor and mimic for miR9 were used to assess its ability in changing SOCS4 expression. Results showed a 0.2 fold reduction in expression with the mimic, and a negligible change in expression from the inhibitor. Chemotaxis assays were performed on THP1 monocytes transfected with miR9 mimic or inhibitor to measure the effect of miR9 on monocyte migration. THP1 cells treated with the miR9 mimic displayed an increase in migration by 40% (n=10 replicates) compared to control cells, whereas the inhibitor showed no change in migration (n=10 replicates).

Our results suggest miR9 is upregulated in RA monocytes, and miR9 plays a role in monocyte migration.

Supported by: FURSCA

PIETRO GEISLER, '16
Progress Toward a Catalyzed Synthesis of Biphenyls from Phenylboronic Acid

Faculty Sponsor: Clifford Harris
Major: Chemistry
Hometown: Grand Blanc, Mich.

Forming carbon-carbon bonds is an important synthetic reaction in organic chemistry. One such formation involves the use of manganese (III) acetylacetonate with phenylboronic acids. These phenylboronic acids react stoichiometrically with manganese (III) acetylacetonate to form biphenyls. This produces a significant amount of manganese waste compared to the product, and thus is an environmental

concern. As such, finding a way to reduce the amount of manganese used would be beneficial. As the first step in development of a catalytic system, persulfate was tested for utility as a stoichiometric oxidant. Biphasic reaction conditions (H₂O and CH₂Cl₂) were used to find the mole percent manganese (III) acetylacetonate giving the highest yields of biphenyl products. Iron (III) sulfate was also tested as a catalytic oxidant. Neither catalytic oxidant produced high yields of biphenyl.

Supported by: FURSCA

DAVID GOSLIN, '17

(See Managing People and Organizations Projects)



SPENCER GUST, '16
The Flint Water Crisis

Faculty Sponsor: Wesley Dick
Major: Geology
Hometown: Douglas, Mich.

Flint, Michigan has played a prominent role in American history. It is the birthplace of both General Motors and the United Auto

Workers Union. GM originated in 1915 and the UAW came of age during the legendary Flint Sit-Down Strike of 1936-7. In the late 1980s, Flint made national news as a poster city for deindustrialization in the documentary film "Roger & Me."

In 2015, Flint's drinking water crisis put the city back in the news. By February 2016, the nation was aware of the Flint crisis, epitomized by a *Time* magazine cover story: "The Poisoning of an American City: Toxic Water, Sick Kids, and the Incompetent Leaders Who Betrayed Flint." *Time's* full-page cover photo of two-year-old Sincere Smith, suffering from a full-body rash linked to Flint's water, personalized the poignancy of this unfolding drama. And lead, banned from gasoline and paint because of its toxicity, was revealed to be in Flint's drinking water, endangering the health and development of thousands of children and adults.

How did the Flint water crisis occur? Who was responsible? Centering on the damage done to children and the traumatization of an entire community, the Flint story raises questions of race, poverty, environmental racism, and environmental justice. Keeping environmental historical perspective in mind, this study is based on a review and synthesis of media coverage of the Flint water crisis. It is, of necessity, provisional. However, the urgency of this crisis demands our attention now.

SPENCER GUST, '16

(See Claire Wittkowski, '16, Spencer Gust, '16, Rachel Powell, '16)

RACHEL HAHN, '16

(See Managing People and Organizations Projects)



JORDAN HEMPFLING, '16
Synthesis and Characterization of VVO2(3-methoxysalicylaldehyde semicarbazone)

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

Dioxovanadium(V) complexes have been of interest for their medicinal applications.

For example, salicylaldehyde semicarbazone complexes have been shown to exhibit anti-tumor activity toward kidney tumor cells (TK-10), and in one recent paper, they have shown to be YopH tyrosine phosphatase inhibitors. Also, peroxovanadium(V) complexes containing uracil or cytosine have shown insulin-like activity. In the lab, we have synthesized dioxovanadium(V) complexes with substituted salicylaldehyde semicarbazone ligands to see how they affect tumor growth in cancer cells relative to unsubstituted salicylaldehyde complexes. However, in the course of the synthesis of the 3-methoxysalicylaldehyde semicarbazone complex, we have observed some unexpected color changes, suggesting interesting redox or ligand behavior. The color of the resulting complex is dependent on different synthetic strategies employed. Each of the three colors have a unique infrared spectrum. We will be presenting the results of EPR, cyclic voltammetry and reflectance spectroscopy studies in order to explain the structural changes seen during the synthesis of these complexes.

Supported by: FURSCA

THERESA HENCSE, '16

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—Soccer Strategies)

ALYSSA HENDRICKS, '17

(See Managing People and Organizations Projects)



CHRISTOPHER HERWEYER, '17
Impractical Peninsula: Attempts at Settling Northern Lower Michigan

Faculty Sponsors: Marcy Sacks, Ian MacInnes
 Majors: History, Political Science
 Hometown: Wyoming, Mich.

The northern half of Michigan's Lower Peninsula has for much of its history been sparsely populated at best. The region experienced very little settlement until after the conclusion of the U.S. Civil War. From the conclusion of the Civil War until the end of the nineteenth century, Northern Lower Michigan experienced a major growth in population. This growth was due in large part to the lumber industry's expansion into the region. Other industries had difficulty establishing themselves in the region, however, and as a result, growth in the region stalled after the decline of the lumber industry. Ultimately, the region's population and economy suffered significantly and took decades to recover, leaving much of the region much the same as it was during its first period of growth.



ABUBAKAR ISHAK, '17
Confronting Global Warming: Policies and Practices in the United States, Japan, and Nigeria

Faculty Sponsor: Allison Harnish
 Major: Petroleum Chemistry
 Hometown: Abuja, Nigeria

This research explores the similarities and differences of policies and practices of global warming in the United States, Japan, and Nigeria. My research is primarily on how more advanced countries have tackled the issue of global warming in the past ten years; not just through investments in green technology, clean energy, smart solutions, etc., but more specifically in terms of policies relating to environmental health and ecosystem vitality. Also, I am taking a look at how citizens in the United States and Japan are mobilized or motivated to adopt new environmentally friendly behaviors and practices. The methods I am going to use for this research include a survey on environmental legislations and how much energy is used from different sources, as well as their emission level in each country. The environmental performance of those two countries can provide an interesting lesson for other countries, especially mine, Nigeria.



SHANE JACKSON, '17

(See Management Consulting Projects—NuStep)



BRANDON JOHNSON, '16 Habituation Learning in *Lumbricus terrestris*

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

Habituation, a decrease in response to a repeated stimulus, is a psychological phenomenon that has been used to study many concepts in psychology. Research on habituation has often been done on invertebrates, such as the research on *Aplysia californica*, a sea slug with a fully mapped nervous system, done by Dr. Erik Kandel. Previous research in the Wilson lab at Albion College has focused on earthworms; the goal of the current study was to investigate whether *Lumbricus terrestris*, a common earthworm, could habituate in response to light, and to study the characteristics of habituation.

The current study consisted of four separate experiments. A worm wheel was designed that allows exposure to light stimuli and easy measurement of responses in the form of movement. The worms were exposed to light as a stimulus; a decreased response to light stimuli as more light stimuli were presented indicated habituation. Earthworms were found to habituate to light when the light was presented in sufficient length (Experiments 1 and 2). Experiments 3 and 4 examined the duration of the habituation, and the time of the light necessary to produce it. A further understanding of how learning occurs in this species will allow detailed examination of the neural changes underlying that learning, which could eventually be used to develop models for other animals, including humans.

Supported by: FURSCA; Albion College Department of Psychological Science, Neuroscience Program

PAUL JOHNSON, '17

(See Managing People and Organizations Projects)



MARGAUX KABODIAN, '16 Google AdWords Campaign

Faculty Sponsor: Vicki Baker
Major: Business, Marketing, and Management
Hometown: Novi, Mich.

In collaboration with Albion College's Marketing and Communications Office and the Admission Office, I developed and successfully ran a Google AdWords campaign to attract potential students to Albion College. In today's society,

millennials turn to the internet for everything and anything, including initial steps in their college search process. Through identifying keywords potential students and parents are searching, I have promoted Albion College's Admission website through Google AdWords. Not only are potential students' questions being answered, but they are being answered on Albion College's website, thus linking them to the college.

CRAIG KEYES, '17

(See Management Consulting Projects—TNR Machine)



MATTHEW KLEINOW, '16 A String Quartet Composition in Sonata Form

Faculty Sponsor: James Ball
Majors: Biology, Music
Hometown: Woodhaven, Mich.

Over the past months, I have worked on a piece for cello, viola, and two violins.

Although I intend on going to graduate school for biology-related studies, I wanted to complete my thesis as a music composition. I had come up with the main theme my freshman year, but I first composed a version of this sonata (for violin and piano) as part of a Music Theory class project at the end of my second year. After I decided that I wanted to improve on and complete the sonata for my Honors thesis, I began working to explore different ways to develop the themes. I placed my focus on displaying the rhythmic interactions of the performers' different parts rather than melodic structure; although there are repeated themes, the chords vary between each distinct iteration of the two themes. I plan to expand this piece into an orchestral arrangement as well as complete three other movements to finish the set and make it a symphony. I hope to return in time to Albion College when the symphony is finished. Although I do have an idea in mind of the concept that I am trying to portray with my sonata, I want to let the audience form their own ideas before I tell them mine. I will seek a publisher once my symphony is complete and has been performed.

BEN KOLANOWSKI, '17

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—Cultur'All)



COURTNEY KONDOR, '17
**Assessment and Design of Mobile Apps
 for Aiding Understanding of Molecular
 Structure**

Faculty Sponsor: Lisa Lewis
 Major: Chemistry
 Hometown: Kalamazoo, Mich.

The knowledge of molecular structure and chemical bonding is essential for any systematic study of chemistry. Valence, an iOS app, was designed to help students learn Lewis structures. This app also helps students gain a deeper understanding of how two-dimensional Lewis structures translate into three-dimensional molecular structures. Valence provides an interactive way for students to play with Lewis structures and gain an understanding of how electrons organize into single, double, and triple bonds along with lone pairs. This hands-on, visual experience encourages students to reflect on and apply what they have learned. Through face-to-face lessons and homework assignments, Valence has been used to teach the fundamentals of Lewis structure. Student learning was assessed with pre- and post-tests, recorded group conversations, exams, and individual interviews. I will discuss how the app has been and can be used in the classroom and report the results of the data collected to date.

Supported by: FURSCA

KADIE KOOLWICK, '16

(See Managing People and Organizations Projects)

NATALIE KRAUSS, '18

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—Soccer Strategies)



ROSS KYNAST, '16
**MiRNA Expression in Inflammatory
 Monocytes**

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

One of the most important molecules in the propagation of the inflammatory response of the body in Rheumatoid Arthritis is Tumor Necrosis Factor Alpha. Its relationship to the regulatory molecule miRNA is of particular importance. MicroRNA binds to mRNA to alter gene expression, and it has been found that the overexpression of TNF α and miRNA is correlated with inflammation in RA patients. I hypothesized that TNF α induces differential regulation of miRNA expression, which perpetuates the inflammatory response that accompanies the disease.

Supported by: FURSCA



ALICE LALONE, '16
**Wet Meadow Restoration Analysis Using
 GIS Technology and Techniques**

Faculty Sponsor: Sheila Lyons-Sobaski
 Major: Biology
 Hometown: Rochester, Mich.

Grand Mere State Park, located in southwestern Michigan, participated in a reclamation project created by the Michigan Department of Natural Resources (MDNR) in 2010. This project was designed to restore the sand dunes in the area that had been destroyed by the former Manley-Peters Sand Mine. The MDNR created a unique restoration plan that involved the planting of seven microhabitats at various times and locations throughout the park. This is different from other restoration efforts because historically only *Ammophila breviligulata* is planted near sand dunes in the hopes that it will jump-start primary succession in the area. During the years of 2012 and 2013 Dr. Sheila Lyons-Sobaski and Mr. Sobaski collected plant specimens and created Domin scale values for the plants in the study area. Starting in the fall of 2015 I classified these plant specimens and created a GIS map to analyze the plant communities in the study area, which can be used in the future for long-term monitoring of the area.

TIM LANGHOLZ, '16

(See Managing People and Organizations Projects)

JARED LARR, '17

(See Managing People and Organizations Projects)

JACK LHAMON, '17

(See Austin Denha, '17, Kevin Claucherty, '17, Jack Lhamon, '17, Robert Petersen, '18)

SARAH LIKENS, '16

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—RunWatch)



CLAUDIA LIU, '16

Theoretical Synthesis of Poverty and Dehumanization

Faculty Sponsor: Scott Melzer
Majors: Sociology, Philosophy
Hometown: Shenzhen, China

This paper is a theoretical extension of theories of dehumanization and poverty. I argue that the structure of poverty itself can reduce people's autonomy and agency, thereby leading to their sense of dehumanization. Given that dehumanization is a process of patterned reduction or negation of certain qualities pertaining to humanness, the reduction of autonomy that follows poverty as a condition of material deprivation is, I argue, dehumanizing. Also, deviations from social norms may result in being made to feel invisible or getting stigmatized. Stigmas about people in poverty omit their individuality and personhood, often replacing these with generalized, simplistic, and negative labels. Being acknowledged for one's existence, individuality, and possession of autonomy and agency are important aspects of being human. Individuals who are living in poverty, to different degrees, experience the loss of these qualities in their everyday lives.



ELENA LUCE, '16

GAAP to IFRS Convergence: Catering to Investors by Embracing Change

Faculty Sponsors: John Carlson, Vicki Baker
Major: Accounting
Hometown: Ludington, Mich.

In 2002, the United States began the convergence of Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS). This convergence of accounting standards would unify the capital market and create a better understanding and comparison of financial statements for businesses all over the globe. However, this convergence is not as easy as setting a due date. It has taken many years to insert the several new steps that we have today, and there is still plenty of progress to be made. One large issue that remains is the disallowance of the last in, first out (LIFO) cost-flow assumption under IFRS. This could cause a potentially large tax burden on companies that currently use LIFO; yet, now is arguably the time to do so due to low inflation costs. Although some may be resistant to the change, it is important to remember that the focus of financial reporting should always be on the needs of investors, the customers of financial reporting.



CORBIN LIVINGSTON, '16

Developing a Sustainable Catalyst: Optimization of Palladium/Carbon Composite

Faculty Sponsor: Kevin Metz
Majors: Chemistry, Music
Hometown: Sturgis, Mich.

Approximately 90% of commercial chemical processes utilize catalysis, mainly heterogeneous catalysis. In recent years, nanoscience has revealed that metal nanoparticles are excellent catalysts. However, the direct application of nanoparticles for catalysis is limited by issues of removal. Here, we present the fabrication and application of a carbon-supported palladium nanoparticle catalyst. A greener, one-step method was used to embed palladium nanoparticles directly into the infrastructure of the carbon microspheres. The results of our synthesis and catalytic studies will be presented.

Supported by: FURSCA



TARA MAHON, '16

Updating Albion College's Carbon Audit

Faculty Sponsor: Timothy Lincoln
Major: Biology
Hometown: Haslett, Mich.

About two decades ago Albion College signed an agreement, along with other colleges around the nation, and declared a commitment to fighting global climate change by monitoring and reducing its carbon footprint. Since then the school has conducted several yearly carbon audits, but has not done so since 2008. A carbon audit is the process of assessing an organization's total greenhouse gas emissions, calculated as equivalent mass of CO₂, and using that information to make improvements. The audit takes into consideration many aspects including student and faculty commutes, electricity use, natural gas intake, college-sponsored travel, and much more. From the time when the last carbon audit was completed in 2008, Albion has made significant changes in order to decrease its carbon intake. Major examples include the reconstruction of Baldwin Dining Hall to make it a more sustainable facility, changes in lighting strategies, and an increased efficiency in our boilers. I seek to analyze the data provided by the carbon audit and use to make suggestions as to how the college can further decrease its carbon intake and hopefully become a leader in sustainability.

ANDREW MARTIN, '18

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—RunWatch)

JOSH MASSAB, '16

(See Management Consulting Projects—TNR Machine)

RYAN MATYNKA, '17

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—SmartMask)

BRENDAN MCCLOREY, '16

(See Management Consulting Projects—NuStep)

**MOLLY MCCRUM, '16****Childhood Vaccinations: the History, the Purpose, and the Policies**

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

One cannot watch TV, listen to the radio, browse the internet or even engage in a conversation with another person without the topic of vaccines being mentioned. This topic has recently become the headline of many discussions in the news and media. It is no secret that it affects every U.S. citizen and can often become a heated debate. Should you or shouldn't you vaccinate children? This question is surrounded by numerous subcategories like the schedule of vaccinations, the side effects, if they are truly needed, and much more. These all add to the discussion, making a parent's choice much more complicated. Not only are people talking about the topic more, but the government is starting to incorporate new policies that are making it much harder to exempt a child from vaccines. Exploring these ideas and more, the goal of this thesis will be to deconstruct all the messages and information people are receiving and portray the accurate and scientific information to educate those about the past, present, and future when it comes to childhood vaccinations.

**SARAH McDANIEL, '16****Unstuck: Exploring Musical Interpretations of Kurt Vonnegut's Literature**

Faculty Sponsor: Daniel Palmer
Majors: Music, Anthropology/Sociology
Hometown: Allegan, Mich.

Kurt Vonnegut, American writer of novels, short stories, plays, and speeches—including the Calvaruso Keynote Address during the 2002 Elkin Isaac Research Symposium—crafted stories prime for inspiring music. Vonnegut's style of darkly humorous anthropological science fiction effectively conveys the author's cock-eyed insights in a straightforward manner, often delving into absurdity. Growing up in Indianapolis during the Great Depression, surviving military service during World War II, and struggling to become an author until finding success starting in the 1960s and '70s, Vonnegut's lived experiences profoundly impacted his perspective and writings. Themes that permeate his work continue to resonate in today's world, including the pointless and horrific nature of war, coping with dehumanization and environmental degradation induced by capitalism, and coming to terms with humanity's penchant for self-destruction.

As a culminating honors thesis project for my undergraduate studies in music and anthropology/sociology, I produced four original pieces of music with the goal of exploring themes, styles, and techniques of four Vonnegut novels: *Slaughterhouse-Five* (1969, and where the term "unstuck" refers to the protagonist's time travels), *God Bless You, Mr. Rosewater!* (1965), *Breakfast of Champions* (1973), and *Galápagos* (1985). I researched Vonnegut's life and works, music that others have composed with Vonnegut as inspiration, and also composition and performance practices in music. As a result, I developed an experimental approach to composition utilizing unconventional sources—specifically, the Library of Congress call numbers found on each novel in the Stockwell-Mudd Library. My thesis attempts to capture the eccentricity found in Vonnegut's works, allowing his insights to reverberate through music.

**AUSTIN MCKEE, '16****Minimally Regulated Private Markets and Prospects for Organ Donation Policy**

Faculty Sponsor: Andrew Grossman
Major: Public Policy
Hometown: Rockford, Mich.

The current system for organ donation fails to meet the demand that exists within the United States. I believe that by creating an incentive-based system we can increase the supply of harvested organs for transplantation. This thesis is preliminary analysis applying relatively free-market principles to organ donation policy in the USA. I hope to begin



to shape an argument that a policy shift toward a minimally regulated free market will benefit more people than the current organ donation policies, which are often ineffectual and often, too many times, deadly for those waiting for organ transplantation.



JESSICA MCKINDLES, '16
It's Not About Being Male, It's Beliefs About What Being a Man Entails: The Relationship Between Gender, Gender Role Beliefs, Self-stigma, and Attitudes Toward Counseling

Faculty Sponsors: Andrea Francis, Eric Hill
Major: Psychological Science
Hometown: Kingsford, Mich.

Previous research suggests females are more likely to seek counseling than males (Nam et al., 2010). Pederson and Vogel (2007) found that males who have restrictive beliefs about masculinity, such as being independent, experience conflict when seeking psychological help. Gender role conflict in women would arise when a woman behaves independently, rather than seeking help. In addition to gender identity, Leong and Zachar (1999) found that less socially restrictive perspectives about mental illness predict more positive attitudes toward seeking counseling. This study seeks to address whether gender identity or beliefs about gender roles are more predictive of self-stigma and attitudes toward counseling. Self-stigma occurs when one labels oneself as unacceptable because of having a mental health concern (Corrigan, 2004). If the gender identity theory is correct, males should have greater self-stigma and be less open to seeking counseling than women. If the gender beliefs theory is correct, then all individuals who have less socially restrictive views of gender, regardless of identified gender, would have less self-stigma and more open attitudes toward counseling than those with restrictive views.

In this study, participants completed a series of surveys. Results suggest that it is gender role beliefs, not just gender, that is related to self-stigma and attitudes toward counseling. Thus, if we want to encourage individuals to be more open to counseling, making people more open and flexible with their beliefs about gender should be a key part of intervention.

Supported by: FURSCA



CARLEIGH McMAHON, '16
The Effects of Ambient Noise on Nestling House Wrens (*Troglodytes aedon*): Response Rate to Parental Food Calls

Faculty Sponsors: E. Dale Kennedy, Douglas White, Sheila Lyons-Sobaski
Major: Biology
Hometown: Birmingham, Mich.

Rising levels of noise pollution may have serious implications to the conservation of many species of birds. Such noise can mask calls from parental birds, causing nestlings to miss calls (missed detections) or to respond to inappropriate stimuli (false alarms); both types of errors could possibly lead to a reduction in survival or reproductive success. The rate of missed detections and false alarms may vary with age of nestlings. During summer 2015, I used playback recordings of different types of ambient noise to examine false alarm and missed detection rates in nestling House Wrens. I hypothesized that missed detections and false alarms by nestlings: (1) would increase with increased level of noise pollution in their environment; and (2) would decrease with nestling age (3-day-old nestlings vs. 10-day-old nestlings). I compared responses of nestlings that were subjected to added noise environments with those with no added noise environments. As expected, increased amounts of noise pollution significantly increased missed detections, and younger nestlings were more likely to miss parental food calls than were older nestlings.

Supported by: FURSCA

NICHOLAS MERCADO, '16
Geologic Mapping of the Moon Using Remote Sensing Techniques: Moulton Crater

Faculty Sponsor: Michael McRivette
Major: Geology
Hometown: Grand Rapids, Mich.

Moulton Crater, named for Forest Ray Moulton (Albion College class of 1894) and best known for the Chamberlin-Moulton planetismal hypothesis, is located on the far side of the moon in a region that has been researched very little. The crater is spatially and possibly genetically associated with Schrodinger Crater, a much larger crater to the south of Moulton. The floors of the craters surrounding Moulton have been volcanically resurfaced, and Schrodinger Crater exhibits evidence of relatively recent volcanism, which is rare among lunar craters. Schrodinger is also situated on the edge of the South Pole-Aitken Basin, one of the largest impact craters in the solar system and a proposed moon colonization site. Despite the importance of these craters, the age and composition remain unclear. This research aimed to characterize and lay out geological units of the crater that have been deposited. I compiled high-resolution imagery of the crater from the Wide Angle Camera (WAC),

Narrow Angle Camera (NAC), and Lunar Orbiter Laser Altimeter (LOLA) on the Lunar Reconnaissance Orbiter and UVVIS imagery from the Clementine mission. By determining Fe wt% and maturity from the Clementine data, different lithologic units such as mare basalts and lower lunar crustal material can be identified. Upon pre-processing the imagery, I was able to perform an analysis and begin characterizing the units. I then compared my calibrated images to the high-resolution WAC, NAC, and LOLA images to see how my measurements match up with changes in topography, surface roughness, and albedo. This enabled me to describe a tentative geologic history of Moulton and adjacent areas.



BRANDON MORETTI, '16
Vanadium Complexes Inhibit Growth of HT-29 Cells via ROS Generation

Faculty Sponsor: Bradley Rabquer
 Major: Biochemistry
 Hometown: Grosse Ile, Mich.

Cancer is characterized by uncontrolled cell proliferation caused by a loss of control of the cell cycle. Many chemotherapeutics have been developed to inhibit this proliferation by inducing apoptosis, or programmed cell death. Previous studies have evidenced the efficacy of organometallic compounds in inhibiting tumor growth. Further studies have been conducted with different metal elements to assess their potential as anti-cancer drugs, especially vanadium. Previously synthesized vanadium complexes (VCs) were able to inhibit growth in breast and colon cancer cell lines to varying degrees. We hypothesized that VCs were inducing apoptosis via caspase 3/7-mediated pathways and inducing necrosis, cell death, by an increase in reactive oxygen species (ROS). HT-29 cells were used as a model of colon cancer, along with a line of noncancerous HEK293 cells. VCs with 5-Br and 3-OMe functional groups were used as treatments. An ROS generation assay assessed both cell lines after being treated with 5-Br and 3-OMe VCs for variable interval incubation periods. There were no significant increases in HT-29 ROS generation after 4-, 24-, or 48-hour incubation periods with either treatment. After 72 hours, however, the 5-Br-VO₂ yielded a 51.3% ($p < 0.05$) increase in ROS generation, and the 3-OMe-VO₂ yielded a 46.0% ($p < 0.05$) increase. A caspase 3/7 apoptosis assay was also used to determine caspase activation with no activity compared to the positive control after treatment of HT-29 cells with 5-Br-VO₂. We found that VCs were able to inhibit HT-29 growth through likely generation of ROS, rather than through caspase activation of apoptosis.

Supported by: FURSCA



MITCHELL MOORE, '16
U.N. Security Council Reform: Keeping International Peace and Security Within It

Faculty Sponsor: Carrie Booth Walling
 Major: Political Science
 Hometown: East Lansing, Mich.

The United Nations Security Council (UNSC) is tasked to maintain international peace and security as stated in Chapter I of the United Nations Charter. The five permanent members—China, France, Russia, the United Kingdom, and the United States (P-5)—have the heavy burden of maintaining international peace and security by always having a permanent seat and exercising their use of the veto. The Council only works when the P-5 can reach consensus on how to respond to a threat. Reform of the Council needs to occur now to protect the international community from having an illegitimate and ineffective Council that only responds to threats where none of the P-5 members have an economic, political, and/or private motive. As threats to international peace and security continue to evolve and place pressure on the P-5, new opportunities should exist to allow other states to contribute to the heavy burden of maintaining international peace and security by expanding membership. Membership should also be expanding to make the Council appear to be a more representative body. The last time the Council was reformed was through the 1965 amendment, which only expanded non-permanent members. Reform of the Council is a critical task as it is the primary body that regulates all use of force, including self-defense, in the world. The Council needs to be reformed to be a more representative, effective, and accountable body through increased membership and updating working methods.



SHANNON MURPHY, '17
Coupling Reactions Catalyzed by Palladium/Carbon Composites

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

Composites are useful materials because they contain unique properties that combine the properties of two different materials. One of the applications of metal nanoparticles is their use in the field of catalysis. Palladium nanoparticle composites can be used as a catalyst in coupling reactions, which form C-C bonds. In this project, carbon microparticles were made by electronic spray pyrolysis and then palladium nanoparticles were placed on top of these microparticles. The resulting composites were then used to carry out Suzuki coupling reactions. The latest results of this project will be presented.



ALYSSA NINKOVICH, '17

(See Management Consulting Projects—Humanergy)



STEPHANIE NORWOOD, '17 Characterization of Chemical Mechanical Polishing of Thermal Oxide Coated <1, 0, 0> Silicon Wafers

Faculty Sponsor: Charles Moreau
Major: Dual-Degree Program in Engineering
Hometown: Dearborn Heights, Mich.

Chemical Mechanical Polishing, originally used in the creation of electronics, is now being adapted for use in nanofabrication. Chemical mechanical polishing techniques must be modified for nanofabrication, where near atomic smoothness is required. Variations in thickness of tens of nanometers or roughness on the order of a few angstroms will impact the structure of nanoscale structures subsequently fabricated on the wafers. The thermal oxide coated wafers are polished using a variety of parameters to optimize smoothness and oxide removal rate. Data on non-uniformity and removal rate is determined by scanning the wafers in a surface interferometer, and the resulting 3D scans are then compared to untreated silicon wafer scans.

Supported by: Department of Physics and Lurie Nanofabrication Facility (University of Michigan, Ann Arbor)



ALYSSA OBERT, '17 Quantitative Water Testing Using API Kits

Faculty Sponsor: Vanessa McCaffrey
Major: Chemical Engineering (3/2 Program)
Hometown: Commerce Township, Mich.

The API water testing kits are found in fish stores that are used for testing concentrations of ions such as nitrate, nitrite, phosphate, and ammonia in the 0-100 ppm range. Monitoring these ions are important to maintain water quality for the health of the fish and plants in an aquarium. The API water testing kits have a color-coded chart to associate the color with an approximate ion concentration. Looking at the color chart, some of the colors are very similar, making it difficult to tell whether it's one concentration versus another. Other ways of testing for these ions include taking samples to labs or using other water testing kits, which can be quite expensive. In this project, the API testing kits were evaluated for their ability to measure concentrations exactly, instead of ranges or approximate concentrations; for example, could these kits be used to measure 3.56 ppm of ammonia, instead of a concentration around 5 ppm. The information gained from this project will be used to help in other fields such as river, stream, or lake water testing, middle school or high school science projects/experiments, or

possibly basic home water testing. Quantitative water testing was performed with the kits and monitored by UV/Vis spectrometry. Beer's Law plots for nitrite and phosphate in the 0-10 ppm range and nitrate in the 0-40 ppm range have been successfully generated. These results and the results from comparisons to concentrations determined from ion chromatography will be presented.

Supported by: FURSCA



LAUREN PAWELEC, '16 Mapping Tibetan Ultrahigh-Pressure Terranes Using Remote Sensing Techniques

Faculty Sponsor: Michael McRivette
Major: Geology
Hometown: Woodhaven, Mich.

The Tibetan plateau, created by the collision of India with Asia about 50 million years ago, contains in its mountainous northern region a series of exposures of ultrahigh-pressure (UHP) rocks and associated ophiolites (fragments of oceanic crust), themselves the products of much older continental collisions. The four localities focused on in this study, Dulan, Luliang Shan, Xitie Shan, and Qing Shan ('shan' = mountains), are currently separated by 10s-100s of km, but have been proposed to be the exposed parts of a much larger UHP/ophiolite belt created during a single collisional event. However, this proposed genetic link remains speculative partly as a consequence of a lack of detailed geologic mapping and petrographic analysis for these localities. To address these issues for these difficult-to-access sites, remote sensing techniques were employed. Specifically, multispectral ASTER satellite imagery was used to produce spectral maps of the UHP/ophiolite exposures based on the unique spectral characteristics of different rock types. The spectrally identified rock units were confirmed by petrographic analysis of samples previously collected in the field at the Luliang Shan locality, and the spectral map pattern was checked against geologic field mapping that was completed during sample collection. Spectral maps for the remaining localities were then compared with the Luliang Shan spectral map to produce tentative geologic maps and lithologic identifications for these other sites. The potential genetic link between the four UHP/ophiolite exposures in northern Tibet was then evaluated based on the map pattern relationships and the inferred lithologic variation between the sites.

ROBERT PETERSEN, '18

(See Austin Denha, '17, Kevin Claucherty, '17, Jack Lhamon, '17, Robert Petersen, '18)

MAISEY PETERSON, '17

(See Managing People and Organizations Projects)

**MARIAH PHELPS, '16**
German Geo-economic Power and NATO

Faculty Sponsor: Andrew Grossman
Major: Public Policy
Hometown: Lawton, Mich.

Germany's relationship with Russia is a significant contribution to German economic power. Due to its economic prosperity, its relationship with Russia, and NATO's anti-Russian agenda, Germany has begun to act independently of and directly against traditional NATO interests. As a key European power, NATO members look to Germany to take the lead on important issues. Germany's increased power means that its political leaders can command policy in a way that other countries cannot. As NATO moves to revive its military protocols in the wake of the events in Crimea and the Ukraine (to name just two recent events that have disrupted international security and politics), Germany may assert its political power in ways that diverge significantly from other NATO members.

RACHEL POWELL, '16

(See Claire Wittkowski, '16, Spencer Gust, '16, Rachel Powell, '16)

**LAUREN RASMUSSEN, '17**
Determining the Optimal Metal Ion Concentration for Hydrolytic Enzyme Activities of Microbial Communities

Faculty Sponsor: Ola Olapade
Major: Biochemistry
Hometown: Saline, Mich.

Several metals, including zinc, copper, and iron, are found ubiquitously in various environments and are required by microbial communities as trace elements to function during their enzymatic activities. However, especially in aquatic systems, some of these metals can also be found predominantly as cationic forms in various environments, where they accumulate and became toxic to microbial assemblages. Therefore, this study was designed to determine the optimal threshold for zinc (Zn^{2+}) tolerance by indigenous bacterial populations and their hydrolytic enzyme activities from three separate freshwater environments, including the Kalamazoo River, Rice Creek, and the Huron River with their watersheds located within the Lower Peninsula of Michigan. These bacterial communities were exposed to Zn^{2+} concentrations ranging from 0 to 10 $\mu\text{mol/L}$ over a 48-hour period in the dark. Total bacterial abundance and

hydrolytic enzyme activities were then enumerated every four hours using nucleic acid staining and spectrophotometric approaches, respectively. Overall, the results showed that while Zn^{2+} concentrations did not significantly influence total bacterial abundance directly, influence of increasing zinc concentrations was observed on hydrolytic enzyme activities over time. The differences among the freshwater sites could be due to variations in prior exposure to similar contaminants by the microbial communities in each aquatic system.

Supported by: FURSCA

SY RIDDELL, '16

(See Managing People and Organizations Projects)

OLIVIA SAVAGE, '17

(See Managing People and Organizations Projects)

JESSICA SCOTT, '16
NCAA Division I Athletic Departments' Social Media Policy Content: An Update to Sanderson

Faculty Sponsor: Andy Boyan
Majors: Communication Studies, Economics and Management
Hometown: Canton, Mich.

Collegiate athletic departments are working to manage social media content posted by their student-athletes in a variety of ways. In an effort to examine those strategies, Sanderson (2011) published a thematic analysis of student-athlete handbook social media policies. The present research uses Sanderson's themes as a guide for developing a content analysis of 223 NCAA Division I student-athlete handbooks collected in 2014. This descriptive research demonstrates that social media policies have become more commonplace. In addition, the types of content strategies that are used in policies are quantified in an effort to establish a baseline for research in how social media is managed by collegiate institutions. Strategies are also examined for differences between athletic conferences and for signs of proactive versus static social media management.

Supported by: FURSCA



JESSICA SCOTT, '16

(See Managing People and Organizations Projects)

pools were enlarged using polymerase chain reaction amplification. Nine rounds of RNA aptamer selection have been completed, and electrophoretic mobility shift assays will be used to characterize the RNA aptamer pool.

Supported by: FURSCA

DAVID SIMON, '16

(See Management Consulting Projects—Caster Concepts)

ROBERT SOMMERVILLE, '16

(See Management Consulting Projects—TNR Machine)



TAYLOR SHELL, '16

An Exploration of Artistic Process Based on Personal Vulnerability

Faculty Sponsors: Bille Wickre, Ashley Feagin
Majors: Art, English (Creative Writing)
Hometown: Birmingham, Mich.

In *An Exploration of Artistic Process Based on Personal Vulnerability*, I expand on a FURSCA summer project in which I developed a creative thesis based on my explorations of vulnerability. My art draws influence from the works of Janine Antoni, a feminist artist whose work confronts contemporary issues. By creating work that comes from personal experiences, I bring to light a sense of vulnerability while instilling hope in others. My presentation will cover my work in sculpture, sound, and video art. I will discuss the development of my artistic identity through these materials, specifically how the various approaches provide a suitable platform for the discussion of human vulnerability. I consider this first body of work to be my artistic fingerprint on the world. This work is the basis of my portfolio from which I will be using to apply to graduate schools and various exhibitions.

Supported by: FURSCA



EMMA STAPLEY, '16

Defining Entropy: Poems

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

When I started looking for a topic for my honors thesis that would serve as a capstone to my double majors in English and biology, writing poems that engaged with science seemed like a fun, though not particularly sane, choice. The goal for the project has been to produce both a small collection of poems that are invested, in one way or another, in science and an accompanying essay to describe and explain my process. To accomplish this, I read a range of poems that successfully incorporated scientific themes (and some that weren't very successful at all), planned and wrote ten poems, and then revised and revised and revised some more. As the project's title suggests, I used the conflict between entropy (the tendency toward disorder) and biological organization as a center point for the collection. The poems not only address scientific concepts, but also integrate scientific principles into their structure: in two poems, each of the lines starts with A, C, G, or T to create codons that spell out words in one letter code; one works with the format and implications of a Turing test; one uses the structure of Wilfred Owen's "Dulce et Decorum Est" to contemplate the limits of scientific understanding; and one explores the links between entropy, mitochondria, and love poetry. While it was never easy to combine scientific precision and the natural ambiguity of poetic language, this project has provided an invaluable opportunity to reflect back on and conclude my four years at Albion.



MEGAN SHERIDAN, '16

Synthesis and Characterization of Ribonucleic Acid Aptamers Targeted at Aspergillus Cell Surface Carbohydrates

Faculty Sponsor: Christopher Rohlman
Major: Biochemistry
Hometown: DeWitt, Mich.

Aspergillosis is a disease characterized by the degradation of the respiratory system due to *Aspergillus fumigatus* fungal hyphae. The slow establishment of the infection yields low rates of detection and high mortality rates in immunosuppressed patients in intensive care units and internal medical wards. RNA aptamers may aid in the detection of aspergillosis using the cell surface carbohydrate beta-D-glucan. The aptamers would be screened to bind selectively to the cell surface carbohydrate of the fungus, where positive signals would be useful in the identification of infection. This work will describe the isolation of RNA aptamers from a randomized sequence population of 1020 to 1024 variants. RNA aptamer pools were synthesized from an original synthetic DNA oligonucleotide containing a 40-mer randomized sequence, and *in vitro* transcription was conducted to assemble the RNA molecules. Selection was performed in rounds against beta-D-glucan, and



EMMA STAPLEY, '16
An Exploration of GMOs as a Means of Learning About Science Writing

Faculty Sponsor: J. Dan Skean
 Majors: English, Biology
 Hometown: Sparta, Mich.

Genetically Modified Organisms (GMOs) play an extremely important role in modern agriculture. However, few researchers have managed to clearly communicate with the public about their work, leading to widespread public mistrust of and misconceptions about genetic modification. Because of this, GMOs provide a perfect way to explore science writing. My project was to write a short unbiased book, geared toward the general public, explaining the basic science, history, application, and ethical issues of transgenic crops. This allowed me to learn to present scientific information in a way that helps laypeople to make informed decisions about the topic.

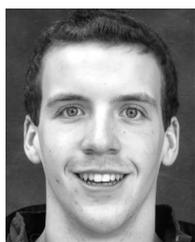
Supported by: FURSCA

PAUL STEWART, '16

(See Managing People and Organizations Projects)

JORDAN STINCHCOMB, '17

(See Managing People and Organizations Projects)



ANDREW STRZELECKI, '18
Bromine Clathrate

Faculty Sponsor: Craig Bieler
 Major: Dual-Degree Program in Engineering
 Hometown: Wixom, Mich.

Clathrate hydrates are a class of inclusion compounds in which a small gas molecule is contained within a cage-like lattice of frozen water molecules. Clathrate hydrates containing small amounts of hydrocarbons and other gases, methane clathrate for example, are widely abundant on the seafloor. Clathrate hydrates have very high densities. One of the most unusual properties of clathrate hydrates is that they have a melting point higher than pure water. In this study, UV-Vis absorption of bromine was used to measure the vapor pressure of bromine above bromine clathrate as a function of temperature. The system was calibrated by measuring the UV-Vis absorption of pure bromine gas as a function of temperature and by then correlating the peak area with known vapor pressures of bromine. This data can be used to determine the melting point of bromine clathrate, the enthalpy of dissociation of the clathrate, and the crystal structure of bromine clathrate.

Supported by: FURSCA

ETHAN SUTTON, '17

(See Austin Denha, '17, Ethan Sutton, '17)

TIMOTHY SZOCINSKI, '16
Modulus Graphs with Applications to the Collatz Conjecture

Faculty Sponsor: David Reimann
 Majors: Mathematics, Physics
 Hometown: Sterling Heights, Mich.

The Collatz Conjecture is a famous problem that has been unsolved for over 70 years. Many have attempted to prove the conjecture but have failed to provide anything beyond merely just good evidence for it being true. In fact, the conjecture has been proven for the first 10 billion Collatz sequences. One way to prove the conjecture is directly by proving that every Collatz sequence converges. The other way is to prove that there are no divergent sequences and that in every sequence there are no non-trivial cycles. In this talk, I will describe a new method for attempting to prove that there do not exist any sequences that have non-trivial cycles. I use an original idea, named modulus graphs, to easily prove that a Collatz sequence will eventually reach a particular congruence class. This transforms the problem from the integers to a combinatorial graph problem on subsets of integers.

Supported by: FURSCA



GRACE TALASKI, '17
Cloning and Expression of the Glucosamine-1-phosphate Deaminase Gene *NagB* from *Escheria coli*. Progress Toward Measuring Michaelis-Menten Kinetics for Phosphoglucosamine Mutase

Faculty Sponsor: Lisa Lewis
 Majors: Chemistry, Music Performance
 Hometown: Caro, Mich.

Phosphoglucosamine mutase (GlmM) is critical for catalyzing chemical reactions necessary to form precursor molecules in bacterial cell wall biosynthesis. GlmM interconverts glucosamine-1-phosphate and glucosamine-6-phosphate and is an unexploited antibiotic target. To assay GlmM, a route was chosen that uses a linking enzyme, Glucosamine-Phosphate Deaminase (NagB), that converts glucosamine-6-phosphate to fructose-6-phosphate. The overall goal of this project is to determine the kinetics of the GlmM catalyzed reaction from glucosamine-1-phosphate to glucosamine-6-phosphate. Specific objectives include determining the maximum velocity (at a constant enzyme concentration) and Michaelis constant for this GlmM catalyzed reaction using the Michaelis-Menten equation. Because of the importance of GlmM in the formation of bacterial



cell walls, learning the kinetics of the GlmM reaction may expedite the formation of antibiotic agents that inhibit cell wall formation in bacteria.

I performed this research as a part of the CBiRC REU program at Iowa State University under the direction of Dr. Adam Barb in the summer of 2015.

Supported by: Center for Biorenewable Chemicals, Iowa State University

STEPHANIE THURNER, '17

(See William Hart Davis, '16, Stephanie Thurner, '17)

ASHLEY TICE, '16

(See Management Consulting Projects—NuStep)

HANNAH TOLLES, '16

(See Managing People and Organizations Projects)



KATRINA TOOKER, '16 **Victims Within Justice, a New Perspective: Balancing Retributive and Restorative Justice Within the International Criminal Court**

Faculty Sponsor: Carrie Booth Walling
Major: Political Science
Hometown: Allegan, Mich.

The incorporation of the restorative function within a retributively mandated justice mechanism has created waves within the legal and academic community. Many adhere to the belief that criminal courts have one purpose and that purpose is to hold an individual liable for the criminal act that he or she committed and through that accountability punish said person. But while a retributive system is designed primarily to indict, verify, and punish, it also has the possibility of doing so much more when paired with restorative attributes. It is through the textual and procedural analysis of the victim provisions within the Rome Statute that we can begin to understand the ultimately positive, even if sometimes adverse, impact that incorporating a restorative function within a retributively mandated justice mechanism can have on a court. This positive impact includes the victim's sense of justice, which I argue is established through fair procedural representation. It also includes the role that reparations play on those societies transitioning from mass tragedy to a new and functioning society. It is through the impact associated with both the procedural role and the reparations that the combination of non-traditional and traditional justice mechanisms is beneficial for the reformation of society. While this result is representative of a restorative function, it serves a reformatory purpose—in this I use restoration

and reformation in the same manner, suggesting that they both indicate a revival of culture and healing of a society, as well as healing from tragedy that has drastically changed and impacted society. Therefore, the combination of these two systems that are so often set on opposite sides of the justice spectrum are important for the victimized individuals and societies, beneficial to the accused, and can perhaps have an important influence on future trials.



DANIEL TRAUB, '16 **A Description and Systematic Analysis of Eocene Basin-Center Crocodylids from the Green River Basin, Wyoming**

Faculty Sponsor: William Bartels
Majors: Geology, Biology
Hometown: Tiburon, Calif.

This study describes the crocodylids from the Eocene of the Green River Basin. Fossils recovered for this study were found in the lower Bridger Formation, which consists of pastel-colored mudrocks interbedded with brown to red sandstones, thin carbonates, and tuffaceous beds deposited by meandering stream and in lake-margin mudflats.

This collection of seventeen variably complete specimens makes up the largest sample of crocodylids from this interval. Following fossil reconstruction and description, data from morphology was compiled into a character matrix and compared with previously published systematic analyses of crocodylian relationships. Alterations to these existing methods of systematic analysis were developed and discussed.

The early Bridgerian fauna of the Green River Basin contains three species of crocodylids and a new taxon that may represent a primitive alligatorid. This diversity is significantly lower than the 15 species previously described from the Bridgerian of Wyoming. The crocodylid fauna consists of *Borealosuchus wilsoni*, "*Crocodylus*" *affinis*, and "*Crocodylus*" *acer*. *Borealosuchus wilsoni* is characterized by its wide interorbital plate and short symphysis. In concurrence with Brochu (1997), *Diplocynodon stuckeri* and *Leidyosuchus wilsoni* are synonymous with *Borealosuchus wilsoni*. "*Crocodylus*" *affinis* is defined by its characteristic frontal, distinctive teeth, and longer symphysis. "*Crocodylus*" *acer*, primarily represented by isolated teeth, was likely restricted to basin-center lakes. It has a long narrow snout and smooth, lingually curved teeth. The distinctly striated isolated teeth of "*Crocodylus*" *sulciferus* are also present; however, they closely match those of the undescribed primitive alligatorid, indicating possible synonymy.

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

JUSTIN VAN BLARICOM, '16
The Work of John Maynard Keynes and Its Effect on Modern Public Policy

Faculty Sponsor: Zhen Li
 Major: Economics and Management
 Hometown: Naperville, Ill.

No man has influenced modern economics more than John Maynard Keynes. At a time when traditional economic models were powerless to save a rapidly declining Western economy, Keynes revolutionized both the way the world studied macroeconomics and the way public policy was crafted. This paper analyzes the theories and policy recommendations of John Maynard Keynes. It then takes a look at the many competing or confirming theories that have been built throughout the twentieth century. Finally, the paper finds modern examples of how the theories brought about by Keynes influence public policy to this day.

DAVID VAN ITTERSUM, '16

(See Management Consulting Projects—Caster Concepts)

ALLISON VOORHESS, '17

(See Managing People and Organizations Projects)

The effects of Spotted Knapweed on native plant communities were tested at Albion College's Whitehouse Nature Center, where study plots were selected. All plants within the plots were identified and counted using the Domin System of plant density measurement. The density measurements were organized into frequent plant community types found within the study sites. Soil samples were taken from the observational plots to test for catechin levels via HPLC.

Catechin was not detected in any of the 210 soil samples tested; however, high levels of catechin were found within the Spotted Knapweed's roots. Additionally, the presence or absence of Spotted Knapweed had no significant effect on species diversity in the observational plots. These results suggest that catechin may not be an allelopathic chemical used by Spotted Knapweed, and thus Spotted Knapweed's success as an invasive species may not be due to the Novel Weapons Hypothesis.

Supported by: FURSCA

KRISTA WATSON, '17

(See Claudia Crake, '17, Krista Watson, '17)

RYAN WATSON, '16

(See Management Consulting Projects—TNR Machine)

RYAN WATSON, '16

(See Managing People and Organizations Projects)



Walczyk

ANGELA WALCZYK, '16

Major: Biology
 Hometown: Clinton Township, Mich.

ELISE ANDERSON, '17

Major: Biology
 Hometown: Bloomfield Hills, Mich.

Testing the Novel Weapons Hypothesis: Does Spotted Knapweed (*Centaurea stoebe* Lam.) Have an Allelopathic Impact?

Faculty Sponsor: Sheila Lyons-Sobaski

Spotted Knapweed (*Centaurea stoebe* Lam.) is an invasive plant species that is native to Eastern Europe. Some evidence suggests that Spotted Knapweed uses allelopathic chemicals as a method of competition among other plant species. The Novel Weapons Hypothesis further explains the usage of these allelopathic chemicals in a competitive manner by stating that they are used as a "weapon" by invasive species to inhibit the growth of native species. Spotted Knapweed contains the chemical catechin within its root system, and some sources claim that catechin is an allelopathic chemical. Under that assumption, it is possible for Spotted Knapweed to be described as an invasive species under the Novel Weapons Hypothesis.



ERICA WILLOUGHBY, '16

Planning and Implementing a Summer Camp: Teens Exploring Nature

Faculty Sponsor: Barbara Keyes
 Majors: Psychological Science, Biology
 Hometown: Laingsburg, Mich.

As a capstone experience for my human services concentration, I designed and implemented a summer camp for youth living in the Albion area called "Teens Exploring Nature." This project allowed me to integrate my interests in psychology and biology and to enhance my understanding of outdoor education. My goals included exposing youth to outdoor activities, to encourage them to move outside their comfort zone, and to build a sense of community. More specifically, I wanted to emphasize the stress-relieving, relaxing properties of nature as well as introduce the participants to college professors who volunteered to lead one of the 12 camp sessions, which were held at the Whitehouse Nature Center.

In this presentation, I will describe the planning process for recruiting faculty volunteers, camp participants, and funding for camp activities that



included sharing a meal together and craft projects. Some of the nature activities involved visiting the Nancy G. Held Equestrian Center, canoeing in the Kalamazoo River as well as assessing its water quality, observing nesting boxes, identifying trees in the Nature Center, and planting a vegetable and herb garden at the Nature Center. While the youth were learning about nature, I was learning so much more: I gained experience working with an underrepresented population and I learned that working with teenagers is extremely rewarding (and challenging). I plan to dedicate my career to helping teenagers—who are at a high risk for engaging in risky, unhealthy behaviors—find healthy coping mechanisms in a natural setting.

MEGAN WINKLER, '18

(See Albion/SDV Entrepreneurial Exchange: Business Plan Development: An International Partnership between the USA and France—SmartMask)

storage, flat wetlands adjacent to the streams, tiled agricultural fields, and broad, poorly drained upland areas. We used GIS to estimate the relative areas of these potential reservoirs in each watershed to see if reasonable amounts of rainfall recharge could supply the water volumes our analysis suggests. The water in steep recessions could be supplied from wetlands, but not bank storage. Water in gradual recessions can be explained with only a small fraction of the water that falls on uplands.



ALYSSA WRIGHT, '16
A Review of Porcine Epidemic Diarrhea Virus

Faculty Sponsor: Ola Olapade
Major: Biology
Hometown: White Pigeon, Mich.

My research included a comprehensive review of the primary literature on Porcine Epidemic Diarrhea virus to gain a better understanding of the virus and what can be done to prevent future epidemics in a broad sense. This overview of PED covers the history, structure, epidemiology, and the regulatory responses of various organizations such as the U.S. Department of Agriculture, American Association of Swine Veterinarians, Pork Check off, World Organization for Animal Health, and the European Food Safety Authority.

PEDv is an enveloped single-stranded RNA coronavirus that replicates within the cytoplasm of mature villous enterocytes mainly within the jejunum and ileum of the digestive system. The virus has currently only been found to infect pigs, with a mortality rate of up to 100% in neonatal piglets. It is currently the most fatal of all pig diseases and the most costly of all animal health issues due to increased time to market with the piglets that survive infection, as well as sometimes causing abnormal reproductive cycles in sows.



LAURA YURGALITE, '16
Examination of Uses and Motivations of the Mobile App Tinder

Faculty Sponsor: Karen Erlandson
Majors: Communication Studies, Business and Organizations
Hometown: Northville, Mich.

This study investigates motivations and uses of the mobile dating application Tinder. Drawing on Uses and Gratifications Theory, the author poses questions regarding users' motivations, communication strategies, and outcomes from Tinder use, as well as the impact of gender on these variables. A sample of Tinder users (N=251) were recruited to participate in an online survey through an online data collection server. Initial findings suggest that users are most motivated by the ease of Tinder and treat the



CLAIRE WITTKOWSKI, '16
Major: Geology
Hometown: East Grand Rapids, Mich.

SPENCER GUST, '16
Major: Geology
Hometown: Douglas, Mich.

RACHEL POWELL, '16
Major: Geology
Hometown: Beal City, Mich.

Modeling Kalamazoo River Base Flow Recessions: A Window into Recharge Areas
Faculty Sponsor: Timothy Lincoln

During periods of base flow, rivers are fed exclusively by groundwater discharge as water drains from permeable material in the watershed. As the rate of discharge depends on the amount of groundwater remaining, we expect an exponential decay described

by an equation in the form $Q_t = Q_0 e^{-at}$ (Fetter, 2001). Data from the Kalamazoo River and other Michigan watersheds cannot be modeled precisely with a single exponential function; the modeled curves are not concave enough and they significantly underestimate the probable potential discharge available to the river. We have successfully modeled many recessions by summing two exponential functions. A curve with a relatively high recession constant yields a steep recession, dominating early flow but representing a relatively small total potential discharge. This yields to a curve with a lower recession constant, which has a gentler slope and represents a higher potential discharge. We envision four areas that could be the reservoirs represented by these functions: bank



Gust

Powell

application in a manner more similar to a game than to a dating website. In addition, the preliminary findings indicate that gender plays a role in motivations and uses of the application. The author explores the social implications of the study for the effect of intentions and outcomes of online dating on modern relationships.

Supported by: FURSCA



SHUQI ZHOU, '16
Shifted Hecke Insertion and the K-theory of $OG(n, 2n+1)$

Faculty Sponsor: Mark Bollman

Major: Mathematics

Hometown: Wuhan, China

We use shifted Hecke insertion to construct symmetric function representatives for the K-theory of the orthogonal Grassmannian. These representatives are closely related to the shifted Grothendieck polynomials of Ikeda and Naruse. We then recover the K-theory structure coefficients of Clifford-Thomas-Yong/Buch-Samuel by introducing a shifted K-theoretic Poirier-Reutenauer algebra. Our proofs depend on the theory of shifted K-theoretic jeu de taquin and the weak K-Knuth relations.

Supported by: National Science Foundation Research Experiences for Undergraduates

RADOUANE ZIANI, '16

(See Management Consulting Projects—NuStep)

KATIE ZINKEL, '17

(See Management Consulting Projects—TNR Machine)

TAYLOR ZUKE, '16

(See Management Consulting Projects—Humanergy)



ALBION / L'ÉCOLE SUPÉRIEURE DE VENTE (SDV) ENTREPRENEURIAL EXCHANGE

Faculty Sponsors: 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—blending students from Albion College's Gerstacker Institute for Business and Management with students from France—to create international and intercultural business plans. The International Entrepreneurial Exchange (IEE) partnership was started in 2008 and lives on in Gerstacker's annual exchange with L'École Supérieure de Vente (SDV), a business school located in Saint-Germain-en-Laye, near Paris. The goal is 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.

Albion students, along with their advisor, spent the week of fall break in France. During this time French and American students, working in teams, developed market surveys and started to lay the groundwork for the development of a new business venture. They created a market research plan and marketing strategy

for their chosen business. Student teams were coached by French and American experts on their specific endeavor and marketing strategy. At the end of the week, students presented their preliminary business plans. With relationships solidified and plans in place, the teams continued to work together from afar—utilizing virtual meeting rooms and other technology to stay in touch and move the plans forward. The French students spent the week leading up to the Isaac Student Research Symposium in Albion, visiting their American teammates and putting the final touches on their plan, culminating in final presentations at the symposium. The French team(s) with the best business ideas will have the opportunity to present in front of French bankers and venture capitalists in the near future.

The participants are driven by the guiding principles of discovery, creativity, sharing, and empowerment, which determine the success of their projects. 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, to learn foreign business practices and teamwork, and to make lasting friendships. The business plans each student team developed are described below.



Student and staff participants in the 2016 International Entrepreneurial Exchange.

Business Plan Development: An International Partnership Between the USA and France—Cultur’All

MARJORI BOLDT, ’18

Major: Accounting
Hometown: Traverse City, Mich.

BEN KOLANOWSKI, ’17

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

DAVID CHANTELOSE, ’16

Major: Business
Hometown: Saint-Germain-en-Laye, France

MANON CHEVALLIER, ’16

Major: Business
Hometown: Saint-Germain-en-Laye, France

DORIAN GUILLAUME, ’16

Major: Business
Hometown: Saint-Germain-en-Laye, France

MAGALI VUILLIER, ’16

Major: Business
Hometown: Saint-Germain-en-Laye, France

Through the international collaboration program between Albion and Sup de V, we have created a business plan for an intercultural training application. The purpose of our product, Cultur’all, is to gather every tool a businessperson will need when they are abroad for business. Through market research, we have found that it is still a niche market in the U.S. and offers opportunities for innovation. We have established that the use of our application extends into corporate training, colleges, and even to individual consumers. With no other application like this on the market, we are confident that our product has the opportunity to acquire a sizable share of the U.S. intercultural training market.

Business Plan Development: An International Partnership Between the USA and France—RunWatch

SARAH LIKENS, ’16

Major: Communications
Hometown: St. Clair Shores, Mich.

ANDREW MARTIN, ’18

Majors: Business and Organizations, Accounting (CPA Track)
Hometown: Essexville, Mich.

ALEXANDRE DELPRAT, ’16

Major: Business
Hometown: Cergy-Pontoise, France

CÉLESTIN GHALYOUN, ’16

Major: Business
Hometown: Les Clayes-sous-Bois, France

NISHA NAVATHEES, ’16

Major: Business
Hometown: Villeneuve-Saint-Georges, France

MÉGANE TROCHET, ’16

Major: Business
Hometown: Houilles, France

Through the Gerstacker Institute’s entrepreneurial exchange program between Albion and Sup de V students, we have created a business plan for a running watch unique for a team setting. Utilizing GPS, our product allows a coach to be with their runner throughout the duration of a workout by creating a customized route, allowing open communication and downloadable statistics from the run. Through market research, we found our watch will offer solutions at the collegiate and elite running level by tracking data in a consistent and less time-consuming manner, addressing safety concerns and allowing more correspondence during a workout.

Business Plan Development: An International Partnership Between the USA and France—SmartMask

ALENA FAROOQ, ’18

Major: Business and Organizations
Hometown: West Bloomfield, Mich.

RYAN MATYNKA, ’17

Majors: Business and Organizations, Economics
Hometown: Rochester Hills, Mich.

MEGAN WINKLER, ’18

Major: Accounting
Hometown: Kalamazoo, Mich.

FRANÇOIS BUVRY, ’16

Major: Business
Hometown: Villeneuve-d’Ascq, France

ISMAIL DOURI, ’16

Major: Business

TITOUAN NIAULT, ’16

Major: Business

ALLAN URSULET, ’16

Major: Business
Hometown: Brou-sur-Chantereine, France

Through collaboration between Albion College and Sup de V students, we have developed a business model for our product, SmartMask: a high-tech, high-altitude training mask that pushes you to perform better, harder, and faster. The mask incorporates existing technology to simulate higher altitudes using plastic valves along with new, innovative technology that digitally connects the mask to the user’s smartphone. The corresponding app will record vitals, lead training sessions, analyze performance, and much more. Welcome to the future of athletic training.



Business Plan Development: An International Partnership between the USA and France— Soccer Strategies

THERESA HENCSE, '16

Major: Accounting (CPA Track)
Hometown: Troy, Mich.

NATALIE KRAUSS, '18

Major: Economics and Management (International Business)
Hometown: Rochester Hills, Mich.

BENJAMIN AMOUCH, '16

Major: Business
Hometown: Saint-Cyr-l'Ecole, France

PATRICK MINH-DUC BUI, '16

Major: Business
Hometown: Poissy, France

ROMAIN CHAMPAUD, '16

Major: Business

SUTHARSAN RAVINDRAN, '16

Major: Business

BÉRENGÈRE REES, '16

Major: Business

Soccer Strategies was developed through an international collaboration between Albion and Sup de V. Soccer Strategies is a soccer consulting firm with a focus on sports psychology and data analysis. We aim to improve the mental and physical performance of individual players and teams during competition. Through collecting data from sensors embedded in the soccer jerseys, balls, and cleats, our consultants will gain a broad understanding of the abilities of the players. Through our personalized report, clients will be able to enhance both team and individual training programs and overall performance.

MANAGEMENT CONSULTING PROJECTS

Faculty Sponsor: Vicki Baker

Management Consulting Projects—Caster Concepts



*Jarrett Bochniak, Dominic Bona, David Simon, David Van Ittersum, *Missing Joshua Fischer*

JARRETT BOCHNIAK, '16

Major: Business and Organizations
Hometown: Troy, Mich.

DOMINIC BONA, '16

Major: Business and Organizations
Hometown: Pinckney, Mich.

JOSHUA FISCHER, '16

Major: Business
Hometown: Chesterfield Township, Mich.

DAVID SIMON, '16

Major: Economics and Management
Hometown: Portland, Mich.

DAVID VAN ITTERSUM, '16

Major: Business and Organizations
Hometown: Eastpointe, Mich.

Within the automotive conveyor component space, Caster Concepts has struggled with discovering who their competitors are, and identifying potential new customers. Caster Concepts in Albion, Michigan, has developed components that are utilized in an automotive power roll bed assembly that has opened up a new market. Caster Concepts faces the challenge of marketing these new products, and we will be supporting their efforts to better understand potential competitors as well as to identify potential new customers and market share.

Management Consulting Projects—Humanergy



Andrew Baldwin, Bradley Bogus, Gabrielle Campos, Alyssa Ninkovich, Taylor Zuke

ANDREW BALDWIN, '16

Majors: Finance, Philosophy
Hometown: Northville, Mich.

BRAD BOGUS, '16

Major: Business and Organizations
Hometown: Lake Orion, Mich.

GABRIELLE CAMPOS, '17

Major: Communication Studies
Hometown: Holt, Mich.

ALYSSA NINKOVICH, '17

Major: Communication Studies
Hometown: Novi, Mich.

TAYLOR ZUKE, '16

Major: Finance
Hometown: Rochester, Mich.

Through collaborations with Humanergy in Marshall, Michigan, we are working to develop a more strategic social media marketing presence and plan. Project work entails creating a client acquisition strategy and brainstorming ways to help Humanergy with an untapped market based on “foot” traffic to its blog and other social media sites. Additionally, we will support the development of blog content to attract new potential clients.

Management Consulting Projects—NuStep



Collin Ahrens, Cameron Clements, Shane Jackson, Brendan McClorey, Ashley Tice, Radouane Ziani

COLLIN AHRENS, '16

Major: Exercise Science
Hometown: Otsego, Mich.

CAMERON CLEMENTS, '17

Major: Biology
Hometown: Birmingham, Mich.

SHANE JACKSON, '17

Major: Individually Designed Major
Hometown: Albion, Mich.

BRENDAN MCCLOREY, '16

Major: Biology
Hometown: Wixom, Mich.

ASHLEY TICE, '16

Major: Business and Organizations
Hometown: Warren, Mich.

RADOUANE ZIANI, '16

Major: Economics and Management
Hometown: Dreux, France

Working toward “Total Brain Health,” we will be supporting NuStep to deliver “The Longest Day Event” scheduled for June 20 from 5:58 a.m.- 9:21 p.m. The goal is to raise \$500,000 and engage over 450 teams. NuStep has partnered with the Alzheimer’s Association on this event. In the past, NuStep has engaged with senior living communities because of the prevalence of senior citizens using the NuStep product. This year the goal is to engage other communities, including fitness centers and a younger generation of college students interested in total body health.



Management Consulting Projects—TNR Machine



*Aly Bates, Josh Massab, Robert Sommerville,
Ryan Watson, Kaitlin Zinkel*

ALY BATES, '16

Major: Economics and Management
Hometown: Novi, Mich.

CRAIG KEYES, '17

Major: Economics and Management
Hometown: Chelsea, Mich.

JOSH MASSAB, '16

Major: Business and Organizations, Finance
Hometown: Northville, Mich.

ROBERT SOMMERVILLE, '16

Major: Individually Designed Major
Hometown: Grosse Pointe Park, Mich.

RYAN WATSON, '16

Major: Business and Organizations
Hometown: Delton, Mich.

KATIE ZINKEL, '17

Major: Psychological Science
Hometown: Birmingham, Mich.

We are supporting TNR Machine in Dowling, Michigan, with their human resources function. Specifically, we are supporting their pay-for-performance efforts by offering advice and best-practice research to enhance their already existing incentive board. The goal is to increase productivity while decreasing turnover, absenteeism, and other poor workplace behaviors. The incentive board can be a tool that continues to motivate existing employees while also serving to gain the attention of other organizational employees.

Managing People and Organizations Projects



*Team 1 - Marjori Boldt, Allison Voorhess, Megan Britton,
Paul Stewart, Tim Langholz*



*Team 2 - Olivia Savage, Isabel Fontana, Kadie Koolwick,
Jessica Scott, Maisey Peterson, Rachel Hahn*



*Team 3 - Cameron Clements, Nathan Dirado,
Harry Cooney, Paul Johnson*



*Team 4 - Andrew Byrne, Andrew Baldwin, Marius Froehlich,
Hannah Tolles, Khamsi (Sy) Riddell*



Team 5 - Tyler Covell, Jared Larr, Jordan Stinchcomb, Jack Barlow (missing: David Goslin)



Team 6 - Ryan Watson, Alyssa Hendricks, McKenzie Bueck (missing: Damon Eldridge, Carolyn Adamczyk)

CAROLINE ADAMCZYK, '17

Major: Finance
Hometown: Chicago, Ill.

ANDREW BALDWIN, '16

Majors: Philosophy, Finance
Hometown: Northville, Mich.

MARJORI BOLDT, '18

Major: Accounting
Hometown: Traverse City, Mich.

MEGAN BRITTON, '17

Majors: French, Business and Organizations
Hometown: Frankenmuth, Mich.

JACK BROWNLOW, '17

Major: Accounting
Hometown: Grand Rapids, Mich.

McKENZIE BUECK, '17

Major: Anthropology/Sociology
Hometown: Avon Lake, Ohio

ANDREW BYRNE, '16

Major: Business and Organizations
Hometown: Grand Haven, Mich.

CAMERON CLEMENTS, '17

Major: Biology
Hometown: Birmingham, Mich.

HARRY COONEY, '16

Major: Communication Studies
Hometown: Berkley, Mich.

TYLER COVELL, '16

Major: Economics and Management
Hometown: Cedar Springs, Mich.

NATHAN DIRADO, '17

Major: Communication Studies
Hometown: Northville, Mich.

DAMON ELDRIDGE, '16

Major: Economics and Management
Hometown: Berkley, Mich.

ISABEL FONTANA, '16

Major: Psychological Science
Hometown: Bloomfield Hills, Mich.

MARIUS FROEHLICH, '16

Majors: Business and Organizations, Communication Studies
Hometown: Farmington Hills, Mich.

DAVID GOSLIN, '17

Major: Finance
Hometown: Midland, Mich.

RACHEL HAHN, '16

Major: Psychological Science
Hometown: Kalamazoo, Mich.

ALYSSA HENDRICKS, '17

Major: Finance
Hometown: Comstock Park, Mich.

PAUL JOHNSON, '17

Major: Economics and Management
Hometown: Birmingham, Mich.

KADIE KOOLWICK, '16

Major: Biology
Hometown: Bloomfield Hills, Mich.

TIM LANGHOLZ, '16

Major: Public Policy
Hometown: Kentwood, Mich.

JARED LARR, '17

Major: Accounting
Hometown: McBain, Mich.

MAISEY PETERSON, '17

Major: Economics and Management
Hometown: Clarkston, Mich.



SY RIDDELL, '16

Majors: Economics and Management, Exercise Science
Hometown: Traverse City, Mich.

OLIVIA SAVAGE, '17

Majors: Economics and Management, Business and Organizations
Hometown: Macomb, Mich.

JESSICA SCOTT, '16

Majors: Economics and Management, Communication Studies
Hometown: Canton, Mich.

PAUL STEWART, '16

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

JORDAN STINCHCOMB, '17

Major: Economics and Management
Hometown: Goodrich, Mich.

HANNAH TOLLES, '16

Major: Psychological Science
Hometown: Dearborn, Mich.

ALLISON VOORHESS, '17

Major: Economics and Management
Hometown: Mount Clemens, Mich.

RYAN WATSON, '16

Major: Business and Organizations
Hometown: Delton, Mich.

We are continuing efforts of the 1,700 Hearts & Minds events that were hosted during the Fall 2015 semester. The goal is to support collaborations between the College and the Community as we seek to revitalize Albion. Student teams are meeting with community constituents to learn more about the assets and available opportunities in the community. The goal will be to develop partnerships and programming for community members and our younger population.

About the Symposium

Albion College's Student Research Symposium is now in its 27th year. 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 more than 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 sponsor an alumni lecture each year. In 1997, the lectureship was expanded and is now associated with the College's annual Student Research Symposium, which now bears Isaac's name.

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)
Hugh McDiarmid, '84 (2014)
Samata Singhi, '05 (2015)

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)
Richard Alley (2014)
Nathan Wolfe (2015)

The 2016 Isaac Student Research Symposium Committee

Craig Bieler (Chemistry)
Andrew Christopher (Psychological Science)
Allison Harnish (Anthropology/Sociology)
E. Dale Kennedy (Biology/Brown Honors Program)
Lisa Lewis (Chemistry)
Beth Lincoln (Geology)
Anne McCauley (Art and Art History)
John Perney (Marketing/Communications Office)
Michael Van Houten, Chair (Stockwell-Mudd Libraries)
John Woell (Academic Affairs)



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.



Albion College

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