

Elkin R. Isaac
Student Research Symposium
Albion College



2015



Albion College

2015 Elkin R. Isaac Student Research Symposium

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Elkin R. Isaac Alumni Lecture



SAMATA SINGHI, '05

As a child, Samata Singhi listened to her grandfather's stories about taking medical care to remote villages in their native India. Accompanying her physician parents to their immunization drives in city slums, she saw children suffering from malnutrition and dehydration. These experiences eventually inspired her to pursue a career in medicine and public health.

Today her interests stretch across the whole spectrum of healthcare—from grassroots access to bedside practice to governmental policymaking.

While an Albion student, Singhi was elected to the cabinet of Student Senate, and helped found the International Student Union. Through her medical externships and volunteer work in India and the United States, she developed a greater understanding of the disparities of access and outcomes in healthcare, and presented these in her honors thesis at Albion. For her work, she received the Maurice L. Branch Award for outstanding research and scholarship in economics. She was also elected to Phi Beta Kappa.

After graduating from Albion summa cum laude with majors in chemistry and economics, she headed to the London School of Economics and Political Science where she earned a master's in international health policy and health economics. She then returned to the United States to pursue her medical degree at Case Western Reserve University. As a medical student, she conducted research in pediatric neurology at the Kennedy Krieger Institute in Baltimore and at Johns Hopkins University School of Medicine, supported by fellowships from the Child Neurology Foundation and the Doris Duke Charitable Foundation.

Singhi is currently chief resident for the Child Neurology Program at Boston Children's Hospital/Harvard Medical School. On completing her residency in 2016, she plans to pursue a career in academic medicine and continue to advocate for projects that promote effective and efficient medical care for all members of society.

Joseph S. Calvaruso Keynote Address



NATHAN WOLFE

Called the "Indiana Jones of virus hunting," Nathan Wolfe travels the world to track, study, and eradicate the next pandemic before it strikes. One of *Time's* 100 Most Influential People in the World for 2011, he draws on his breakthrough discoveries to tell us where viruses come from, why they spread, and how to stop them.

By concentrating on how epidemic diseases—such as HIV, SARS, and West Nile—all stem from human contact with infected animals, Wolfe is able to discover new threatening viruses where they first emerge. His ultimate goal through this research is to reinvent global pandemic control, by developing what he calls "viral forecasting." He has established a dozen field sites worldwide in viral hot spots most at risk for human infection with animal-borne diseases, in order to provide an early-warning system that can help reduce the spread of viral diseases and potentially save millions of lives.

His debut book, *The Viral Storm*, chronicles his research trips, revealing "the surprising origins of the most deadly diseases and the role that viruses have played in human evolution."

Wolfe is the Lorry I. Lokey Business Wire Consulting Professor in Human Biology at Stanford University; the founder and chief executive officer of Metabiota, a company that specializes in microbiological research, products, and services; and the chairman of Global Viral, a nonprofit that promotes understanding, exploration, and stewardship of the microbial world. Listed among the *Rolling Stone* "100 Agents of Change," he has been named a National Geographic Emerging Explorer and a World Economic Forum Young Global Leader. He is also the winner of the National Institutes of Health Director's Pioneer Award. Wolfe has received over \$60 million in grants and contracts from Google, the National Institutes of Health, the National Science Foundation, the Bill & Melinda Gates Foundation, and the U.S. Department of Defense, among others.



Student Presentation Schedule | Thursday, April 23, 2015

FORUM #1 – NORRIS 100

8:30	Adam Kudirka (Rabquer)	The Role of Monocyte miRNA in Rheumatoid Arthritis
8:45	Safiya Syed (Rabquer)	miR155 Is Increased by Inflammation and Modulates the Expression of CD11a in Monocytes
9:00	Michelle Samson (Metz)	Carbon Microparticle and Silver Nanoparticle Synthesis for Filtration of Heavy Metal in Water
9:15	Corbin Livingston (Metz)	Synthesis, Characteristics, and Catalytic Application of Bare-Palladium Nanoparticles on Carbon Microsphere Composites
9:30	Scott DesRosiers (Lyons-Sobaski)	Comparison of Age, Growth, and Condition of the Round Goby <i>Neogobius melanostomus</i> in the Western Basin of Lake Erie
9:45	Kara Bowers (Kennedy, White)	Nocturnal Desertions and Initiation of Dawn Activity in Female House Wrens (<i>Troglodytes aedon</i>)
10:00	Brent Heerspink (Olapade, T. Lincoln)	Bio-Geo-Chemistry of Nitrate Transporting Seeps along the Upper Kalamazoo River

1:15	Joe Silvestri (Saville)	Developing a <i>Drosophila</i> Model for the Study of Mumps Viral and Host Cell Interactions
1:30	Jordan Hempfling (McCaffrey)	The Curious Colors of Vanadium(V) Complexes
1:45	Victoria Sochor (Rabquer)	An Exploration of Apoptotic Mechanisms in Cancer Cells Using Vanadium Complexes
2:00	Kayleigh Harvey (Menold)	Thermodynamic Analysis of UHP Eclogite
2:15	Lindsay Ciastko (Zellner, Davidson)	Studies of Binary Star Systems Using Speckle Interferometry
2:30	Stefan Blachut (Seely)	Pattern Discovery and Predictive Modeling Using Social Network Analysis
2:45	Katie Strunk (Bollman)	A Markov Chain Analysis of the Monopoly Speed Die
3:00	Paxton Mueller (Mason)	The Mathematics of Sofya Kovalevskaya
3:15	Jack Manquen (Saville)	The Role of NEK2 and PKN1 Kinases in Cancer
3:30	Katherine Sexton (Rabquer)	Confirmation of the Role of sJAM-C in Monocyte Migration via the Erk Pathway
3:45	Morgan Carey (Rabquer)	Soluble Junctional Adhesion Molecule-B Inhibits Angiogenesis <i>in Vitro</i>

FORUM #2 – TOWSLEY LECTURE HALL/NORRIS 101

8:45	Laura Steavenson (Lockyer)	<i>An American in Paris: Stories of My Summer in France</i>
9:00	Holley Taylor (Mesa)	<i>A Temporary Living</i>
9:15	Kaitlin Soper (Dixon)	Character Perspectives Explored through a Webcomic
9:30	Grace Talaski (McIlhagga, Warnhoff)	Concerto for Clarinet and String Orchestra, Aaron Copland
9:45	McKenzie Schafer (McIlhagga, Balke)	Story of Strength: Two Arias from an American Opera

1:15	Kate Sears (Kudzia)	Web Coding: What Is It and What Is It Good For?
1:30	Andrew Mattson, Jacob Terberg (Sacks)	Curating Controversy: Creating a Digital Exhibit of Racist Images
1:45	Andrew Mattson (Sacks)	The Historical and Cultural Significance of Sports in Currier & Ives' Racist "Darktown Comics"
2:00	Olivia Potoczak (Christensen)	The Climate Pickle: True Stories about Climate Change for the Millennial Generation
2:15	Phillip Carlisle (Jordan)	<i>The Portrait of Mr. Oscar Wilde: A Grossly Indecent Musical</i>
2:30	Joshua Eggen (Mourad)	The Dragon in Japan
2:45	Laxmi Kotha (Valdina)	Ayurveda for the Future: Redefining Indian Medical Traditions in the Contemporary World
3:00	Shelby Fox-Purrier (Hagerman)	"An Ecstasy of Fumbling": Chemical Weapons and the Changing Nature of Warfare in World War I, 1915-1918
3:15	Kathleen Casebeer (Lewis, Bieler)	The History of the Study of Chemistry at Albion College
3:30	Lauren Dever (Dick)	Saving the Humans by Restoring the Environment: Michigan and the Civilian Conservation Corps, 1933-1942

FORUM #3 – NORRIS 102

8:30	Johanna Schulte (Franzen)	The Patriarchy of Welfare Reform: Legislating the Nuclear Family Model
8:45	Victoria Malus (Chase)	Genetic Ancestry and Social Identities: Investigating My Family's Heritage Using Direct-to-Consumer Genetic Tests and Oral Histories
9:00	Bailey Judson (Franzen)	Why Don't We Know: An Analysis of Human Trafficking in the United States and What Is Being Done About It
9:15	Kelsey Miller (Melzer)	The Impact of Social Forces on the Development, Course, and Duration of Personality Disorders
9:30	Katharine Korthase (Jechura)	Effect of Personal Characteristics on Hiring Practices
9:45	Emily Zimmer (Elischberger, Keyes, Henke)	Twenty Years Later: Cohort Differences in High School Seniors' Academic Motivation and Aspirations for the Future
1:15	Megan Wickens (Wilson)	Acquisition and Retention of Learning in the Earthworm
1:30	Ashley Glenn (Wilson)	The Effects of MK-801 on Learning and Memory in Earthworms
1:45	Zach Kribs (Wieth)	How Should I Think About This? The Importance of Multiple Perspectives for Indecisive Individuals When Performing Divergent and Convergent Thinking Tasks
2:00	Shanti Madhavan (Francis, Wieth)	Easy Does It When Starting an Exam: Order of Difficulty and Exam Performance
2:15	Melissa Woodard (Jechura)	Sleep and Well-Being

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2:30	Jessica Glazier (Elischberger)	Boys Don't Cry: Adult Perceptions of Children Who Defy Gender Roles—An International Comparison
2:45	Stephen Foster (Elischberger)	Predictors of Mental Health Stigma
3:00	Emily Morlock (Keyes, Hill)	Understanding the Role of Psychotropic Medications in the Treatment of Post-Traumatic Stress Disorder
3:15	Nicholas Diamond (Yewah)	A Pluralistic Approach to Disease Treatment in Senegal

FORUM #4 – NORRIS 104

8:30	Alyssa Glenn, Randolph Kardas, Alexis Cottreau, Marianne Lafon, Nalya Andriampita, Quentin Solomianski (Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—Bonne Cuisine
8:45	Nicholas DiMaggio, Trenton Mikek, Jonathan Dufour, Steve Garneri (Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—S.A.F.E.
9:00	Caitlyn Berard, Alex Carey, Julia Malecke, Carine Engasser, Nanyang Jiao, Maraim Kinkonda (Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—Revive
9:15	Steven Dickmann, Julie Wood, Julien Assez, Mickaël Badibanga, Zakaria Benrahal, Matthieu Del Rio (Draudt, Nakfoor, Towhill, Bruneteaux-Swann)	Business Plan Development: An International Partnership between the U.S.A. and France—Silhouette
9:30	Sara Sample (French)	Tout Ce Qui Est Vieux Redevient Nouveau: Farming Practices Old and New in France and America
9:45	David Utrata (Harnish)	Investigation of Best Practice Sustainability on American College Campuses

1:15	Patrick Lopez (Grossman)	Misreading Russia: Russian Strategic Culture and the Ukraine Crisis
1:30	Joshua Engel (Rose)	Bob Dylan and American Political Thought
1:45	Elizabeth White (Grossman)	Eurocepticism in the European Union: A Case Study of the United Kingdom Independence Party
2:00	Madeline Drury (Melzer)	From Individual to Agitator: Establishing a Collective Identity in the Civil Rights Movement
2:15	Lindsay Weiss (Verduzco-Baker)	Sex Education and Teaching Consent: Implications for Sexual Assault Prevention
2:30	Craig Kreger, Jr. (Melzer)	Color Me Deviant: The Stigmatization of Tattoos

2:45	Patrick Zimmer (Melzer)	Rape Culture as Portrayed through Film
3:00	Candace Myers (Walling)	Retribution, Reconciliation, and the Role of Religion in the International Courts: A Case Study of the Extraordinary Chambers in the Courts of Cambodia
3:15	Patrick Buck (Cocks)	Uses of Chinese Legalism from the First Emperor to Mao Zedong
3:30	Alexandria Crim (Walling)	Transitional Justice: Case Studies of Guatemala and Chile

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

Dylan Danowski (Betz)	The Relationship between Psychological Momentum and Sport Performance over Time
Austin Denha (Reimann)	3D Printing at Albion College
Megan Grobbel (Lyons-Sobaski)	Population Genetics of Spotted Knapweed
Kayleigh Harvey (T. Lincoln)	Analysis of Phosphate in Riparian Sediment Pore-waters: Does Phosphate Sequestered in the Stream Bed Contribute to the Phosphate Load of the Kalamazoo River?
Carl Jones, Chance Seely (Wilch, T. Lincoln)	GIS Mapping and Characterization of Groundwater Input into the South Branch of the Kalamazoo River
Kristi Kotrapu (McRivette)	GIS for Geologic Research: Design and Development of a Geodatabase for Field-Based Research in Tibet
Alice LaLone (Skean)	The New Albion Community Food Center: A Partnership for Better Nutrition
Allison McClish (Albertson)	<i>Wolbachia</i> Infection Frequency and Cytoplasmic Incompatibility in a Michigan Population of <i>D. melanogaster</i>
Shannon Murphy (Metz)	Synthesizing Shaped Palladium Nanoparticles with Natural Reductants
Nikhil Patel, Rachael Vitale (Jechura)	An Exploration of Circadian Rhythms in Crayfish
Josh Pender (Metz)	Synthesis of Activated Palladium Nanoparticles (PdNPs) on Carbon Microspheres (CMs) for Use as a Hydrogenation Catalyst
Alex Pool (Betz)	Albion College Student Health Study
Megan Sheridan (Rohlman)	Synthesis and Characterization of Ribonucleic Acid Aptamers Targeted at <i>Aspergillus</i> Fungus Cell Surface Carbohydrates
Glenn Tigner (Bartels)	Description of a Remarkable Occurrence of Fossil Turtles from the Eocene of Wyoming
Ruolin Wang (Bartels)	Invertebrate Paleontology of the Mississippian Michigan Formation, Bellevue, Michigan
Cassandra Ward (Roberts)	Childhood Imagined: The Relationship between Image and Text in Storytelling
Nicholas Webster (Rohlman)	Synthesis and Characterization of Deoxyribonucleic Acid Aptamers for β -D-Glucan Carbohydrates

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(poster session continued)

Cristina Ybarra Garcia (Harris)

Synthesis of Symmetrical Biphenyls Using Phenylboronic Acids and Manganese (III) Acetylacetonate

Evan Young (McCaffrey)

Formylation of Substituted Phenols Using Microwave Irradiation

Shuqi Zhou (Bollman)

Computer Simulation and Mathematical Analysis of Games Using Nonstandard Card Decks

Warner Ball, Aly Bates, Riley Coon,
James Hartley, Alyssa Hendricks,
Hannah Litvan, Shantella Sherman,
Daniel Traub, Tyler White
(Baker, Chytilo, Rahn)

Albion Accelerator Projects: Artists' Cooperative

John Brownlow, Austin Christie, Matt Falls,
Alexandra Hill, Elle Root, Olivia Savage,
Doug Schomer, Kate Sears, Chelsea Weiss,
Elizabeth Witkowski (Baker, Chytilo, Rahn)

Albion Accelerator Projects: Community Arts Center

Maggie Cripe, Ashley Glenn, Alyssa Glenn,
Elena Luce, Jessica Scott
(Baker, Chytilo, Rahn)

Albion Accelerator Projects: Day Care

Bethany Brooks, Alexis DeLand,
Madeline Drury, Ellery Ekleberry,
Anthony Genna, Eric Guindi,
Craig Keyes, Alex Kuligowski, Kyle O'Grady,
Kaitlin Pytleski, Robert Sommerville,
Mark Zeigler, II (Baker, Chytilo, Rahn)

Albion Accelerator Projects: Makerspace

Alex Balavich, Chantal Chuba,
Lauren Daniels, Sam Hier, Christina Jackson,
Ben Kolanowski, Rob Lamb, Liqi Luo,
Taylor Macielak, Trenton Mikek
(Baker, Chytilo, Rahn)

Albion Accelerator Projects: Post-Baccalaureate Program

Abstracts of Student Presentations

ALEX BALAVICH, '18

(See Albion Accelerator Projects: Post-Baccalaureate Program)

WARNER BALL, '15

(See Albion Accelerator Projects: Artists' Cooperative)

ALY BATES, '16

(See Albion Accelerator Projects: Artists' Cooperative)

CAITLYN BERARD, '15

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

information developed through such types of network analyses, we can begin to predict fraudulent activity and award-winning authors.

Supported by: Oak Ridge Associated Universities, Higher Education Research Experiences at Oak Ridge National Laboratory, U.S. Department of Energy



KARA BOWERS, '15

Nocturnal Desertions and Initiation of Dawn Activity in Female House Wrens (*Troglodytes aedon*)

Faculty Sponsors: E. Dale Kennedy, Douglas White
Major: Biology
Hometown: Ann Arbor, Mich.

Dawn chorus of male songbirds is well studied, but little is known about the early morning activities of female birds and the factors that affect the time an incubating female first leaves her nest. House wrens (*Troglodytes aedon*) are diurnal songbirds, and most incubating female wrens remain on their nests all night and then leave sometime between civil twilight and sunrise, when there is enough light to begin foraging. However, if disturbed by nocturnal predators, incubating females exhibit temporary desertion in the night and may not return to their nests until civil twilight. Around civil twilight, there is a minimum level of illumination sufficient for wrens to move about but not forage.

I hypothesized that male house wrens would begin singing and that nocturnally displaced females would return to their nests when there was sufficient light to move around. I also predicted that undisturbed females would not leave their nests until after males begin singing, when there was sufficient light to begin foraging. In the summer of 2015, I monitored nest attendance, gaps in nocturnal incubation, and male singing of house wrens at Whitehouse Nature Center. I used iButton™ temperature sensors to record the start and end times of gaps in nocturnal incubation and the morning departure times of female house wrens. I found that nocturnally displaced females do indeed return around the time of dawn chorus (average for female return = 23 min before sunrise) and that undisturbed females leave their nests later (average = 10 min after sunrise).

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

BETHANY BROOKS, '15

(See Albion Accelerator Projects: Makerspace)

STEFAN BLACHUT, '15

Pattern Discovery and Predictive Modeling Using Social Network Analysis

Faculty Sponsor: David Seely
Majors: Mathematics, Physics
Hometown: St. Clair Shores, Mich.

Social network analysis is used to explore features and characteristics of groups of

connected persons or objects. To understand activity in a network, we explored two different methods of social network analysis. Our first method was designed to understand how activity propagates through a network. Given a referral network and a set of known fraudulent healthcare providers, we built a linear threshold model which propagates the spread of fraud through a network of provider referrals. We then assessed the risk of fraud for all providers in the network. Our second method was to examine specific features about nodes of interest. For example, do fraudulent healthcare providers have fewer social connections than non-fraudulent providers?

We examined three social networks—a network of doctors, a network of referrals among doctors, and a network of collaborating authors—and looked at the features for every individual in these networks. We then compared the features of fraudulent providers to non-fraudulent providers and of award-winning authors to non-award-winning authors. This comparison identified trends in which features differ between the compared groups. These differences indicate that fraudulent providers and award-winning authors behave distinctly in social graphs. This tells us that the way a node is situated in a graph correlates to their activity in that graph, implying that nodes that are similarly situated could exhibit the same activity. Using





JOHN BROWNLOW, '17

(See Albion Accelerator Projects: Community Arts Center)



PATRICK BUCK, '15 Uses of Chinese Legalism from the First Emperor to Mao Zedong

Faculty Sponsor: Geoffrey Cocks

Major: History

Hometown: Grand Rapids, Mich.

My thesis discusses how the ancient Chinese political philosophy known as “Legalism” has been used and interpreted by Chinese intellectuals and statesmen throughout the past two thousand years of China’s history. Looking at the writings and speeches of both ancient Legalist thinkers and modern Chinese communists, I argue that this school of Chinese political thought significantly influenced the development of Chinese Marxist thought in the twentieth century. Starting with Mao Zedong’s admiration for ancient Legalist rulers, Chinese intellectuals have been engaged in a public debate over the legacy of Chinese Legalism ever since the 1950s. With the discovery of China’s first Legalist emperor’s terracotta army in the 1970s and his depiction in the internationally acclaimed film, *Hero* (2002), Chinese Legalism has become an increasingly important issue in the past several decades. No longer do we just see “Red China” or “Confucian China.”

Supported by: FURSCA—James W. Hyde Fellows in Student/Faculty Research

ALEX CAREY, '16

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



MORGAN CAREY, '15 Soluble Junctional Adhesion Molecule-B Inhibits Angiogenesis *in Vitro*

Faculty Sponsor: Bradley Rabquer

Major: Biology

Hometown: Hemlock, Mich.

Angiogenesis is a significant part of physiological processes such as healing, reproduction, and development. It also plays a major role in pathologic processes including cardiovascular disease, rheumatoid arthritis, and tumor growth. Angiogenesis is controlled by a balance of pro- and anti-angiogenic mediators. To date, there are many more known pro-angiogenic factors, including vascular endothelial growth factor (VEGF). Junctional adhesion molecules (JAMs) are a newly described family of adhesion molecules that have been shown to play roles

in inflammation and angiogenesis. Soluble JAM-C (sJAM-C) is a pro-angiogenic mediator. Recently, inhibition of JAM-B has been shown to reduce tumor volume and vascularity. In addition, our previous work has shown that sJAM-B inhibits basic fibroblast growth factor induced angiogenesis.

Based on these findings, we hypothesized that sJAM-B is a broad-based anti-angiogenic mediator capable of inhibiting VEGF and sJAM-C induced angiogenesis. To test this hypothesis, we performed *in vitro* angiogenesis experiments using human microvascular endothelial cells (HMVEC). We found that sJAM-B decreased sJAM-C induced HMVEC chemotaxis (n=2 separate trials). In addition, sJAM-B significantly inhibited sJAM-C induced HMVEC tube formation on Matrigel (p<0.05, n=3). Moreover, sJAM-B decreased VEGF induced HMVEC chemotaxis (n=2), and inhibited VEGF induced HMVEC tube formation on Matrigel (n=3). Using Western blotting, we also found that sJAM-B exerts its effect by stimulating the phosphorylation of Erk in a time-dependent fashion (n=2). Our results indicate that sJAM-B inhibits sJAM-C and VEGF induced angiogenesis.

Supported by: FURSCA—Orpha Leiter Irwin Research Fellowship in Pre-Medicine



PHILLIP CARLISLE, '15 The Portrait of Mr. Oscar Wilde: A Grossly Indecent Musical

Faculty Sponsor: Sally Jordan

Majors: English, Music

Hometown: Indianapolis, Ind.

Oscar Wilde, renowned poet, playwright, and wit who lived in the late nineteenth century, had a life made for the stage. Wilde’s seemingly picture-perfect existence was marred by the fact that he enjoyed having sex with men—at a time when proof of homosexual acts was an imprisonable offense. The tragic downfall of Wilde’s life began when the Marquess of Queensberry, the father of Wilde’s lover, accused Wilde of “posing as a sodomite.” That accusation led to three infamous trials, and Wilde was ultimately convicted of “gross indecency.” He spent the following two years in jail doing hard labor and living in solitary confinement. Throughout it all, however, Wilde maintained that there was much to learn through the sorrow of his life.

The culmination of three years of research, *The Portrait of Mr. Oscar Wilde: A Grossly Indecent Musical* is a two-act musical comprised of dialogue, staging, lyrics, and music I produced throughout this past year. Whenever possible, I quoted directly from personal letters and transcripts to ensure that the voices of Wilde and his peers were accurately portrayed within the dialogue and lyrics of the musical. Further research into persona poetry, meter, and poetic form provided insight necessary to turn some of those letters and transcripts into poetry—which I later put to music through the use

of notation software. My thesis attempts to capture the brilliance and tragedy of Wilde's life in a way that even he himself would enjoy.

Supported by: FURSCA



KATHLEEN CASEBEER, '17
The History of the Study of Chemistry at Albion College

Faculty Sponsors: Lisa Lewis, Craig Bieler
 Majors: Chemistry, English
 Hometown: Pleasant Lake, Mich.

Primary sources from the Albion College Archives were used to create a timeline detailing the development of the science curriculum at Albion College from its start in the mid-1880s to the present. This historical timeline will be used to understand how the Albion College Chemistry Department first formed and how it has changed over the years to become what it is today. Topics of discussion will include anecdotes about past faculty members, a look at the growth of the curriculum and development of the chemistry and biochemistry majors and the chemistry minor, advancements in infrastructure and apparatus, and student contributions to the department. The discourse will be accompanied by slides of both photographs and historical documents. The overall focus will be on how the Chemistry Department has been shaped over the years: What has changed and what has remained the same?

Supported by: Student Research Partners

AUSTIN CHRISTIE, '16

(See Albion Accelerator Projects: Community Arts Center)

CHANTAL CHUBA, '15

(See Albion Accelerator Projects: Post-Baccalaureate Program)



LINDSAY GLASTKO, '15
Studies of Binary Star Systems Using Speckle Interferometry

Faculty Sponsors: Nicolle Zellner, James Davidson
 Major: Physics (Astronomy Emphasis)
 Hometown: Hammond, Ind.

The study of binary stars, a system in which each star orbits the other, can provide detailed information about the physical characteristics of the system, such as stellar composition and mass. While ground-based telescopes can be used to collect data from stars, Earth's atmosphere makes it very difficult

to create accurate images because it causes fuzzy and unclear images. In order to reduce the effect of the atmosphere, speckle interferometry can be used. This technique uses a series of many short millisecond exposures of a single binary star system that are then combined together, to increase the signal-to-noise ratio and produce an image that allows for a detailed investigation of the stars' properties.

In fall 2015, the Differential Speckle Survey Instrument (DSSI) on the Discovery Channel Telescope (DCT) in Happy Jack, Arizona was used to obtain data from over 250 binary star candidates. For each binary star system, a series of short exposures, averaging 30 seconds on each star, was collected. Data were reduced using the DSSI reduction and analysis codes, written in C and interactive data language (IDL), to determine system properties such as position angle and separation.

In this presentation, I will provide background information about binary stars in general and introduce speckle interferometry. Additionally, I will be presenting the current state of results for our data collected with the DCT.

Supported by: FURSCA, Department of Physics

RILEY COON, '15

(See Albion Accelerator Projects: Artists' Cooperative)



ALEXANDRIA CRIM, '15
Transitional Justice: Case Studies of Guatemala and Chile

Faculty Sponsor: Carrie Booth Walling
 Majors: International Studies, Spanish
 Hometown: Haslett, Mich.

What is a nation to do after experiencing a violent armed conflict or oppressive authoritarian dictatorship? How can a society remain intact when victims and torturers live side by side in the same neighborhoods? Can citizens ever trust their government after it has permitted or even endorsed horrific human rights violations? These are the questions facing nations as they undergo transitional justice, the period between conflict and stability where past crimes are addressed and a new administration takes power. Due to Cold War attitudes and interventionism, both Guatemala and Chile underwent transitional justice processes in the late twentieth century. My research explores the choices made by these two Latin American countries and determines which transitional justice mechanisms were able to lead to greater stability. I also explore if Chile's transitional justice choices are the cause of the country's faster and more complete recovery, and what implications this holds for future transitional movements.



MAGGIE CRIPE, '17

(See Albion Accelerator Projects: Day Care)

LAUREN DANIELS, '16

(See Albion Accelerator Projects: Post-Baccalaureate Program)



DYLAN DANOWSKI, '15 The Relationship between Psychological Momentum and Sport Performance over Time

Faculty Sponsor: Heather Betz
Majors: Exercise Science, Psychological Science
Hometown: Highland, Mich.

Psychological momentum has been defined as a psychological advantage that is gained, which can change an athlete's self-perception, as well as others' perceptions of the athlete (Iso-Ahola & Mobily, 1980). The athlete's change in self-perception is the advantage gained during a performance, but the change could also hinder the athlete's performance if it were negative. Internal and external attributions, commonly called dispositional and situational attributions, offer the athlete an explanation for his or her performance, with positive performances credited to the individual and negative performances to external factors (Roesch & Amirkhan, 1997). Findings suggest internal attributions are more often made following an expected win, as well as an unexpected win, as opposed to an expected or unexpected loss (Lau & Russell, 1980). This study examined the changes in psychological momentum of athletes throughout a season and how their performance changed in regard to their change in psychological momentum.

Twenty-three participants completed Vealy's Sport-Confidence and Competitive Orientation Questionnaire (1986) each week for seven weeks. The Sport-Confidence section of the questionnaire categorized the participant into a sport-trait or sport-state confidence category based on if the participant believed that he or she usually possessed the ability to succeed or if he or she had the ability to succeed at the moment before competition. The Competitive Orientation Questionnaire assessed what the participant rated his or her performance on, the performance itself or the outcome of the competition. Participants filled out the Sport-Confidence questionnaire each week, in addition to questions regarding subjective views on their performance.

ALEXIS DELAND, '17

(See Albion Accelerator Projects: Makerspace)

AUSTIN DENHA, '17

3D Printing at Albion College

Faculty Sponsor: David Reimann
Major: Pre-Engineering
Hometown: Rochester Hills, Mich.

Over the past several decades, 3D printing has gone from the research lab to a rapidly growing technology. Using a 3D digital model, a printer is able to build an object by placing material, layer by layer, under the control of a computer. This technology can revolutionize the way we manufacture and develop goods in diverse areas such as medical, automotive, and art. A fifth-generation MakerBot Replicator 3D printer was purchased jointly by the engineering fraternity, Pi Rho Epsilon, and the Mathematics and Computer Science Department in 2014 as a way to explore this new technology. This printer has an extruder that operates at 215 degrees Celsius that melts and extrudes PLA plastic filament to build 3D objects. It has a build plate that moves down as each layer is placed until the object is complete. Print times vary from 10 minutes to 30 hours based on material density and filament feed rate. My role in this process was to research 3D printers, secure funding, set up hardware, install software, and train users. Current projects include using the printer to make a 3D printed drone with GoPro mounted camera and printing mathematical models. A live demo of the 3D printer will be running during the presentation.

Supported by: FURSCA, Student Research Partners, Pi Rho Epsilon/Student Senate, Department of Mathematics and Computer Science



SCOTT DESROSIERS, '15 Comparison of Age, Growth, and Condition of the Round Goby *Neogobius melanostomus* in the Western Basin of Lake Erie

Faculty Sponsor: Sheila Lyons-Sobaski
Majors: Biology, History
Hometown: Shelby Township, Mich.

The round goby, *Neogobius melanostomus*, is an invasive benthic fish species in the Great Lakes that has had ecological effects on native benthic taxa, sport fish eggs, invasive mussels, and the Lake Erie watersnake (*Nerodia sipedon insularum*). Following two decades of colonization, the population may be reaching carrying capacity resulting in lower condition and phenotypic changes in life history traits. The demographic analysis of the population used 459 individuals collected by seining and bottom-trawling within the western basin of Lake Erie surrounding the Bass Islands during 2006, 2008, and 2015.

To assess how this highly influential population has altered its life history through the course of its invasion we evaluated age, growth, and Fulton Condition Index. Calculations for length-weight distributions for each year revealed positive allometric growth for both males and females in 2006, but negative allometric growth in

2008 and 2015, representing condition factors of 3.33, 2.69, and 2.77 respectively. Total lengths from 2006 ranged from 68.0 to 143.4 mm, 2008 individuals ranged from 36.1 to 75.5 mm, and 2015 individuals ranged from 30.7 to 93.1 mm. Weights of individuals from 2006 ranged from 4.091 to 47.263g, 2008 individuals ranged from 0.533 to 5.908g, and 2015 individuals ranged from 0.286 to 9.387g. The ratio of females to males for 2006, 2008, and 2015 was 1:1.21 (54 females: 48 males), 1:1.81 (136F: 75M), and 1:0.92 (70F: 76M), respectively. Understanding the population structure and life history of this highly influential species is necessary to formulating effective management strategies for Lake Erie.

Supported by: Ohio Sea Grant, Friends of Stone Lab



LAUREN DEVER, '15
Saving the Humans by Restoring the Environment: Michigan and the Civilian Conservation Corps, 1933-1942

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

On New Year's Eve, 1932, Michigan and America faced a double whammy: economic depression and environmental devastation. Unemployment was a staggering 25 percent. Once proud men were standing in bread lines, and Michigan's once regal pine forests were cut over, leaving fields of stumps. Amid this gloomy scene, what would become of a generation of young men coming of age in the Great Depression? Were Michigan's cut-over lands doomed to continued decline? Would 1933 bring change?

Americans invested their hopes in the upcoming presidency of Franklin Delano Roosevelt, who took the oath of office on March 4, 1933. Roosevelt initiated his New Deal for America through the "first hundred days" of frenetic legislative action. Among Roosevelt's proposals was the Civilian Conservation Corps (CCC) through which he envisioned saving the generation of young men coming of age in the 1930s by putting them to work restoring the devastated environment. The young men accomplished many things, and, notably, they planted trees, becoming known as "Roosevelt's Tree Army." Nationally, the CCC planted 2.3 billion trees. Michigan's 102,814 CCC participants planted 484 million trees—"more than twice as many as any other state."

The CCC proved to be one of the most popular New Deal programs, and Michigan was a CCC leader. Even so, the CCC did not transcend America's racial divide. In Michigan there were more than 100 CCC camps, including four all-Black camps and one Indian camp.

This study explores the contributions of the CCC with an emphasis on the Michigan experience, documenting the legacy of state parks, national parks, reforestation, and the building of self-esteem among America's and Michigan's young men. Today, in an

era that is hypercritical of the role of government, the CCC remains an inspirational model of reconnecting people with the land. In the process, the environmental movement was broadened and democratized, and a generation of young men had renewed faith in America. And America would need those young men as it faced its next emergency: World War II.

This presentation will examine FDR's vision and Michigan's response as revealed in the rebuilding of the landscape and in the rebuilding of the lives of Michigan's CCC participants.



NICHOLAS DIAMOND, '15
A Pluralistic Approach to Disease Treatment in Senegal

Faculty Sponsor: Emmanuel Yewah
 Majors: French, Biology
 Hometown: Rochester, Mich.

Senegal, like many other African countries, is a product of a triple heritage: the indigenous African traditions developed through time and climatic change; the Islamic heritage brought about by Arab merchants and Islamic evangelists; and the European tradition, the legacy of colonial adventurism in Africa. These waves of external powers encroaching on the continent brought with them their cultures—art, music, dance, religion, food—as well as their legal and sociopolitical systems. More importantly, and in the context of my thesis, they brought their biomedical or scientific approach to healthcare.

This thesis, inspired by my longstanding interest in global health and reinforced by four months of study abroad in Senegal as well as my firsthand experience shadowing healthcare practitioners in a rural health center and my visit with Doctors Without Borders, discusses the healthy collaboration among practitioners of the indigenous and received/inherited European traditions in medicine through their pluralistic/dualistic approach to the treatment of diseases prevalent in their community today. In order to legitimize such collaboration with biomedical practitioners and at the same time formalize the practice of ethnomedicine, a practice informed by traditions, religion, and spirituality, the Senegalese government introduced regulations and licensing procedures for ethnomedical practices.

Additionally, this thesis considers the many factors, including cost of care, accessibility to health services, choice of gender of practitioners, and the interpretation of disease etiology, that dictate patients' decisions to seek treatment from a biomedical or an ethnomedical practitioner or both.



STEVEN DICKMANN, '16

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

NICHOLAS DIMAGGIO, '16

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

**MADELINE DRURY, '15**
From Individual to Agitator: Establishing a Collective Identity in the Civil Rights Movement

Faculty Sponsor: Scott Melzer
Major: Sociology
Hometown: Milford, Mich.

This project studies civil rights activists' formation of a collective identity and consciousness as it relates to the Civil Rights Movement of the 1960s. Traditional social movement theories minimize the role of individual actors and, instead, focus largely on cultural and structural factors. I sought to better understand individual choices and reasons for joining the movement, especially as they relate to broader cultural and structural factors. I use a grounded theory method to conduct open-ended, semi-structured interviews with civil rights-era activists. My research examines how activists formed a personal sense of collective identity, in part by collecting data on their family backgrounds, early encounters with and participation in civil rights organizations (such as the NAACP), interaction with other activists, and their general views on the movement. My findings suggest there are multiple paths to becoming an activist, and multiple perspectives on what it means to be one, with varying degrees of personal connections to the Civil Rights Movement.

MADELINE DRURY, '15

(See Albion Accelerator Projects: Makerspace)

JOSHUA EGGEN, '15**The Dragon in Japan**

Faculty Sponsor: Ronney Mourad
Major: Religious Studies
Hometown: Canton, Mich.

The dragon is one of the most iconic East Asian mythological creatures. During my study in Japan I was able to research images and stories about dragons academically and experience their cultural importance firsthand. Previous formal studies of the dragon have emphasized the multitude of roles that it can play

in myth, and it is for this reason that I believe that the dragon is important in the study of Japanese religions. The cultural and religious landscape of Japan is complex and diverse both in ancient history and modern times, with Shinto, Pure Land, Zen, Shingon, Christianity, and atheism all playing a role in its development. The dragon is a common element through most, if not all, of these faith traditions, and has persisted from antiquity to the present day in various forms.

I examine source material as well as academic interpretation and artistic representation of the dragon in order to examine the ways that it has been appropriated and transformed in the shifting religious landscape of Japan. My thesis is that dragons serve multiple, sometimes very different, functions in Japanese ritual, art, and culture; certain roles for the dragon are unique to particular religious traditions, but some are shared.

ELLERY EKLEBERRY, '18

(See Albion Accelerator Projects: Makerspace)

**JOSHUA ENGEL, '15****Bob Dylan and American Political Thought**

Faculty Sponsor: William Rose
Majors: Political Science, Sociology
Hometown: Warren, Mich.

Bob Dylan has been studied within pop culture and academia through a variety of standpoints: as a voice of a generation, a poetic hermit, a moral prophet, a movement leader, a political genius, and a musical legend. In this project, those various perspectives will be used with a deep understanding of the dynamics of political theory in proving the claim that Bob Dylan and his work should be canonized into American political thought and thus, the Western canon. To develop this proof, this study draws from literature reviews, direct accounts from Dylan, scholarly works to understand him, documentary and fictional films inspired by him, application of the understanding of political theory, historical and cultural analyses, comparative analyses, and lyrical analyses from various perspectives. The proof will also include rebuttals to the key critiques of the claims. With this proof, the only relevant obstacle Dylan's canonization still faces is furthering the test of time. For the presentation, the focus will be a comparative analysis with a select group of canonized American political theorists including Ralph Waldo Emerson, Walt Whitman, and Henry David Thoreau.

MATT FALLS, '17

(See Albion Accelerator Projects: Community Arts Center)

**STEPHEN FOSTER, '15****Predictors of Mental Health Stigma**

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

People with mental illness are viewed differently from those with physical afflictions. This study examines the social and personal predictors of mental illness prejudice. Participants completed a set of online surveys on beliefs about the interpersonal skills of the mentally ill, and the dangerous nature and incurability of mental illness (separately for unspecified mental illness, clinical depression, and schizophrenia). Participants' knowledge of clinical depression and schizophrenia, their capacity for empathy, and socioeconomic status were also assessed.

We found that subjective measures of socioeconomic status (where a person places themselves on the social ladder) were better predictors of mental illness prejudice than objective measures such as income and education; higher subjective SES indicated more judgmental views of those with mental illness. Our research suggests that the previously documented finding that more empathetic individuals tend to be less prejudiced is primarily driven by two specific facets of empathy, perspective-taking ability and empathic concern. Finally, those with more knowledge of a particular disorder (depression, schizophrenia) tended to be less judgmental of those suffering from it. Overall, however, views of schizophrenia did not follow the same data patterns as clinical depression or unspecified mental illness, possibly due to a low number of people who personally know someone with schizophrenia as well as negative portrayal of schizophrenia in the media. Our data indicate a moderate level of prejudice toward those with mental illness, overall, and suggest that education on the realities of mental illness may be an important component of diffusing stigma.

Supported by: FURSCA

**SHELBY FOX-PURRIER, '16****"An Ecstasy of Fumbling": Chemical Weapons and the Changing Nature of Warfare in World War I, 1915-1918**

Faculty Sponsor: Christopher Hagerman
 Major: History
 Hometown: Fowlerville, Mich.

During the summer of 2015 I studied the development and implementation of chemical weapons in the First World War. Focusing on the British forces of the Western Front from 1915 to 1918, I traced how the use of these new weapons evolved. In accordance with existing literature on tactical, strategic, and logistical progress among British forces during the war, I determined that the British use of chemical weapons revealed a clear 'learning curve.'

Supported by: FURSCA

ANTHONY GENNA, '16

(See Albion Accelerator Projects: Makerspace)

**JESSICA GLAZIER, '15****Boys Don't Cry: Adult Perceptions of Children Who Defy Gender Roles—An International Comparison**

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

We compared U.S. and Indian participants' beliefs about and attitudes toward gender nonconforming children (biological boys who behave in stereotypically feminine ways and vice versa). Each participant read a story about a gender nonconforming child and was asked questions about how much and for what reasons (e.g., religion) they might personally disapprove of the nonconforming behavior, and the extent to which they would want to limit the child's gender expression. We also asked participants to indicate how much of a problem they thought society at large would have with gender nonconformity.

Overall, American participants expressed low, but Indian participants moderately high levels of disapproval with gender nonconformity; respondents in both countries indicated some desire to limit the child's gender expression. Participants with personal connections to the LGBT community responded less negatively, in general, although that effect was more pronounced for U.S. respondents. We found that adherence to traditional gender roles predicted stronger disapproval of child gender nonconformity, primarily so for male participants. Indian women with traditional views on gender were, however, more likely to want to limit the child's gender expression. For American respondents only, being more educated, more socially liberal, and less conservative in religious beliefs all predicted lower rates of disapproval and intent to limit the child's gender expression. Participants in both countries predicted that their respective societies would disapprove at moderately high levels, but the resulting patterns suggested that for Indian participants these predictions might have been an expression of their personal disapproval. Implications for the well-being of gender nonconforming children and their families are discussed.

Supported by: FURSCA—Richard Bethune Student Research Fellowship

ALYSSA GLENN, '17

(See Albion Accelerator Projects: Day Care)



ALYSSA GLENN, '17

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



ASHLEY GLENN, '15

The Effects of MK-801 on Learning and Memory in Earthworms

Faculty Sponsor: W. Jeffrey Wilson
Major: Biology
Hometown: New Hudson, Mich.

MK-801 blocks the NMDA glutamate receptor, which is associated with learning and memory in mammals. Earthworms received a zero (control), low, or high dose of MK-801, then were tested in an instrumental learning apparatus over the course of one four-hour session. Previous studies have shown that undrugged earthworms are capable of learning to make escape responses in order to turn off a bright light, functioning as an aversive stimulus, within this four-hour period. Worms were run in pairs of master and yoked worms. Master worms whose responses control the light for both worms of the pair typically move more than their yoked partner (whose responses do nothing) indicating learning. I found that both the low dose and high dose of MK-801 impaired instrumental learning in the earthworms; drugged master worms' responses were no more than those of the yoked controls. This suggests that the NMDA or analogous receptors present in earthworms have the same function on learning as they do in other organisms. It can also be inferred that glutamate is present in earthworms, suggesting that it is a highly evolutionarily conserved neurotransmitter.

Supported by: FURSCA—Vernon and Gladys B. Lawson Endowed Research Fellowship

ASHLEY GLENN, '15

(See Albion Accelerator Projects: Day Care)



MEGAN GROBBEL, '15

Population Genetics of Spotted Knapweed

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

Populations that begin with few individuals only have a small representation of the total genetic variation within a species. Genetic variation is expected to decline due to their small population size. Spotted knapweed is an invasive plant that outcompetes with natives. Michigan populations were likely started by a few individuals, and these populations may have genetically different founders. If populations began from only a few individuals,

then they are expected to have low genetic variation. If populations were started by non-relatives, then they will differ genetically. To test these hypotheses, I studied variation among four populations of spotted knapweed using microsatellite DNA genetic markers. Microsatellite DNA was amplified using PCR and visualized on a Beckman Coulter CEQ genetic analyzer. The results will provide information on the genetic variation associated with species invasions.

ERIC GUINDI, '16

(See Albion Accelerator Projects: Makerspace)

JAMES HARTLEY, '15

(See Albion Accelerator Projects: Artists' Cooperative)



KAYLEIGH HARVEY, '15

Thermodynamic Analysis of UHP Eclogite

Faculty Sponsor: Carrie Menold
Major: Geology
Hometown: Ada, Mich.

In this study, the mineral and whole-rock chemistry of ultra-high pressure (UHP) eclogites from two different localities were analyzed to understand processes occurring in the subduction channel during continental collision events. Petrochronology on UHP eclogite from the Tso Moriri Gneiss Dome, NW India, supports a single, protracted UHP event across the orogen from ca. 47 Ma to 43 Ma, consistent with the initiation of the Indian subduction at ca. 51Ma. Supplementary to the petrochronology, this study constrains the pressure-temperature path of the same samples using net-transfer equilibria calculations, with peak pressure at 29.49 ± 5.0 kbar and 627.5 ± 67.0 °C. Analysis of the mineral chemistry of phengite also suggests heating during exhumation in the eclogite facies.

At the second locality, the North Qaidam metamorphic belt of Western China, the UHP eclogite shows evidence of multiple devolatilization events occurring at depth and during exhumation. Analysis of whole-rock data allows for stable mineral assemblages at specific pressures and temperatures to be constrained in a pseudosection. By analyzing hydrated mineral assemblages in the eclogite, the devolatilization events can be inferred.

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

KAYLEIGH HARVEY, '15**Analysis of Phosphate in Riparian Sediment Pore-waters: Does Phosphate Sequestered in the Stream Bed Contribute to the Phosphate Load of the Kalamazoo River?**

Faculty Sponsor: Timothy Lincoln

Major: Geology

Hometown: Ada, Mich.

An item of regulatory concern in the Kalamazoo River watershed is dissolved phosphate levels—flux of phosphate from organic sediments to the river is a possible, yet unquantified, contributor to the dissolved phosphate load. Mapping of 18 km of riverbed allows us to estimate that it contains 134,000 m³ of methane-producing sediment. A conservative estimate is that this reservoir could supply the annual dissolved phosphate load of the river for 35 years. Profiles of pore-water show highest concentrations of dissolved phosphate between 10-20 cm into the sediment. At this depth, the average concentration of orthophosphate is 128 ppb, significantly higher than the average concentrations at all depths (73 ppb), and river water (20 ppb).

Pore-waters entering the stream averaged 143 ppb orthophosphate, 7 times that of the stream concentration. Calculated phosphate fluxes range from 3×10^{-10} to 5×10^{-12} g PO₄³⁻/cm²/sec. The higher fluxes appear to occur in locations with high methane effervescence, as inferred from pockmarked sediment surfaces, which result from repeated methane eruptions. This release of orthophosphate from sediment provides the river with a steady supply of phosphate. Calculations show that the highest flux would provide 200% of the observed phosphate load; the low flux would provide about 5% of the load. These data have implications for remediation efforts in the watershed: Because the sediment has accumulated a high concentration of phosphate, any reduction of current sources of contamination may not have an immediate effect on the river's phosphate levels.

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

at low rates to be consistently lower in nitrate, typically <1 ppm. We believe the high nitrate levels of the springs reflect the values of shallow groundwater derived from the adjacent agricultural landscape, while the low values of warm seeps result from nitrate reduction as this water passes through organic-rich riverbed sediment. In contrast, areas of diffuse flow at high rates are highly variable in nitrate concentrations.

The goal of this study therefore was to determine the causes of variability in nitrate concentrations through examination of pore-water and sediment at several sites with diffuse flow at high rates. Cores of loose sediments were collected by freezing the sediment between a central copper pipe and a concentric PVC pipe using dry ice and ethanol sublimation reaction. All sampled locations of diffuse flow at high rates with high nitrate concentrations were shown to have sand or sand and gravel layers at depths of 20-30 cm, and nitrate concentrations peak at that horizon. Total and nitrate-metabolizing bacterial populations were also quantified using fluorescent in situ hybridization. While our data suggest that water chemistry probably does affect bacterial populations, no direct correlation was found indicating nitrate-reducing bacteria are controlling nitrate concentrations with P-values <0.95, ranging from 0.14 to 0.83. We conclude that the permeable layers of sand and gravel are conduits for nitrate transport from adjacent upland agricultural land, through the surrounding wetland and to the river.

Supported by: FURSCA—Orpha Leiter Irwin Research Fellowship in Pre-Medicine

**JORDAN HEMPFLING, '16****The Curious Colors of Vanadium(V) Complexes**

Faculty Sponsor: Vanessa McCaffrey

Major: Chemistry

Hometown: Midland, Mich.

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

In the lab, we have synthesized a dioxovanadium(V) complex to be used in cell cytotoxicity studies. However, in the course of the synthesis, we have observed some very interesting color changes. In the past synthesis of these compounds, we found that the complex would precipitate out as a yellow solid. With the addition of dimethyl sulfoxide, we found a violet or black color based on the ratio of complex and dimethyl sulfoxide. Then, with the introduction of solvents such as water, we could get a green or even a yellow solid. Crystallographic studies were used to try to determine the nature of the color changes in the dioxovanadium(V) complex.

**BRENT HEERSPINK, '15****Bio-Geo-Chemistry of Nitrate Transporting Seeps along the Upper Kalamazoo River**

Faculty Sponsors: Ola Olapade,

Timothy Lincoln

Major: Biology

Hometown: Cedarville, Mich.

Groundwater directly enters the Kalamazoo River in three ways: focused flow in springs, diffuse flow at high rates, and diffuse flow at low rates. River-water nitrate levels range from 2-8 ppm, depending on stage. Previous studies have shown springs to be consistently higher in nitrate, 15-55 ppm, and areas of diffuse flow



ALYSSA HENDRICKS, '17

(See Albion Accelerator Projects: Artists' Cooperative)

SAM HIER, '15

(See Albion Accelerator Projects: Post-Baccalaureate Program)

ALEXANDRA HILL, '16

(See Albion Accelerator Projects: Community Arts Center)

CHRISTINA JACKSON, '16

(See Albion Accelerator Projects: Post-Baccalaureate Program)

adjacent uplands and its influence on groundwater flow, or variations in the glacial stratigraphy in the adjacent uplands. Our study provides the basis for future work which will test these competing ideas.

Supported by: Department of Geological Sciences

**BAILEY JUDSON, '15****Why Don't We Know: An Analysis of Human Trafficking in the United States and What Is Being Done About It**

Faculty Sponsor: Trisha Franzen
Major: Communication Studies
Hometown: Traverse City, Mich.

This thesis analyzes literature about human trafficking in the United States with a focus on Michigan. I reviewed news articles about human trafficking and about how the media cover the issue. I also looked at studies and surveys that analyze the information this country has about human trafficking and what is being done to stop it. The first part of my thesis looks at the problem of human trafficking, what defines human trafficking, and the general background about how large an issue it is. Then, the paper goes on to discuss human trafficking in the United States and focuses on Michigan. I discuss the public perception of this issue and the lack of clear knowledge about trafficking. Next I examine trafficking prevention groups and the survivors of this nationwide problem. Finally, I inform my readers about ways to identify human trafficking and make recommendations about how to prevent it in the future.

RANDOLPH KARDAS, '16

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

CRAIG KEYES, '17

(See Albion Accelerator Projects: Makerspace)

BEN KOLANOWSKI, '17

(See Albion Accelerator Projects: Post-Baccalaureate Program)



Jones

CARL JONES, '15

Major: Geology
Hometown: Clarkston, Mich.

CHANCE SEELY, '15

Major: Geology
Hometown: Macomb, Mich.

GIS Mapping and Characterization of Groundwater Input into the South Branch of the Kalamazoo River

Faculty Sponsors: Thomas Wilch, Timothy Lincoln

This study sought to map the location and density of springs along a 6 km section of the south branch of the Kalamazoo River. The river was traversed between its intersections with Condit Road and the 28 Mile Road Bridge in the town of Albion.

The study was conducted in the months

of August-October, when the presence of colder water and sediment marked the location of springs. The data collected were sediment temperature (spring and channel), surface water temperature, channel depth, and channel water temperature, as well as the depth of water over identified springs. The temperature readings were taken using an OAKTON probe thermometer; all depth measurements were taken using a standard meter stick. The GPS coordinates of all locations were exported to Google Earth and ArcMap GIS software.

This study confirmed that springs along the river banks have a distinctive morphology, with a pool connected to the river's main channel by a narrower stem. This study also showed that springs are both abundant and not uniformly distributed, but rather clustered in parts of the study area. The location of springs could plausibly be controlled by the stratigraphy of the fluvial sediments in the river valley, topography of the



Seely



KATHARINE KORTHASE, '15
**Effect of Personal Characteristics
 on Hiring Practices**

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

Previous research has shown that pheromones, substances released by an individual that elicit a specific reaction in an individual of the opposite sex, can hold an abundant amount of information that is important to daily communication in animals, including humans, although it is rarely processed consciously. Sorokoska (2013) concluded that certain personality traits can possibly be detected through a person's pheromones. Androstadienone, a putative human pheromone produced from testosterone in the axillary regions, has been reported to affect mood and social perceptions, especially in women (Kippenberger et al., 2012).

We hypothesized that the presence of androstadienone on resume materials will result in more favorable evaluations than non-treated resumes, especially among female participants. In addition, participants exposed to androstadienone will perceive the candidate whose resume is being evaluated as more qualified, intelligent, motivated to succeed, and as a better leader than the candidate represented by the non-treated resume.

Participants were randomly assigned to one of two conditions. The experimental group was given a resume that had been pretreated with androstadienone, whereas the other group evaluated an untreated resume. Participants evaluated the candidate for skills relevant to the described job and assessed their perceptions of personal characteristics of the candidate represented by the resume.

Preliminary data suggest that androstadienone does influence resume evaluation, with treated resumes rated more favorably than untreated resumes. These results will show the effect that human pheromones can have on decision-making, which can have an influence on hiring practices.

a significant role in contemporary practice. This presentation is based on a section of my honors thesis in which I analyze changes to the Ayurvedic tradition in terms of education and professional identity. I will further discuss how these aspects factor into issues about credibility in the context of *Madhumeha*, widely considered to be the Ayurvedic equivalent to the disease diabetes mellitus. Analyzing the similarities and differences between the two diseases illustrates the advantages to having two perspectives which see a similar condition in different ways—bringing much needed diversity into the Western healthcare system. The analysis also questions the advantages of obstacles like the stringent definition of “science” and “medicine” that stand in the way of a Western acceptance of alternative fields of medicine like Ayurveda.



KRISTI KOTRAPU, '15
**GIS for Geologic Research: Design and
 Development of a Geodatabase for Field-
 Based Research in Tibet**

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

The Himalaya-Tibet mountain system is the preeminent example of an active continental collision. As such, there has been great interest in understanding the tectonic evolution of the Tibetan Plateau, the largest region of high topography on Earth. To investigate the uplift of the plateau, Michael McRivette conducted fieldwork in northern Tibet over the course of three summers. Large quantities of analog data were generated while in the field (field notes, manually-recorded GPS-measured locations, photographic logs, etc.).

To manage and analyze this information, I designed and developed a geodatabase using ArcGIS, a geographic information systems (GIS) software package. A geodatabase is designed to act as a single entity containing multiple datasets that are spatially- and/or thematically-related and to facilitate manipulation and analysis of data. The fundamental framework of the geodatabase was created by conversion of all GPS geographic coordinates to a digital format for display in ArcGIS as a collection of points. Additional information collected in the field, such as basic rock descriptions and orientation and structural data, was added as attributes of the corresponding points, and field photographs were linked to locations as attachments. Other datasets, including digital elevation data and satellite imagery, are also stored in the geodatabase to provide geographic context and allow for additional analysis through image interpretation and the creation of derived datasets. The geodatabase functions as a comprehensive repository and visualization tool for collected geologic data and the foundation for further inquiries into the tectonic evolution of the Tibetan Plateau.



LAXMI KOTHA, '15
**Ayurveda for the Future: Redefining
 Indian Medical Traditions in the
 Contemporary World**

Faculty Sponsor: Peter Valdina
 Majors: Biology, Religious Studies
 Hometown: Troy, Mich.

As the population of the United States becomes more diverse, alternative forms of medicine are seeing a rise in popularity. One such tradition is Ayurveda, a 2,000-year-old form of Indian traditional medicine. Ayurveda is a changing field with the colonial introduction of allopathic medicine playing



CRAIG KREGAR, JR., '15
Color Me Deviant: The Stigmatization of Tattoos

Faculty Sponsor: Scott Melzer
 Major: Sociology
 Hometown: Albion, Mich.

All I've heard since March of 2011, the year I started getting tattooed was "you're going to regret them" or "these tattoos are going to prevent you from getting a job" or "people are going to look at you differently." I find all of these comments fascinating and a little rude. Historically, tattoos have been considered deviant in our society, but now some scholars believe that the positive depictions of tattoos in popular media have led to the lessening of the stigmas attached to them. They argue that tattoos have gone from symbols of deviance to symbols of "conformity" due to their presence in popular media.

Using symbolic interactionism, I analyze the arbitrary, shifting, and competing meanings assigned to tattoos. I interviewed individuals with tattoos, collecting data on their experiences as a tattooed person, including any discrimination they have experienced, and their views on tattoos and other tattooed individuals. My findings focus on experiences of stigmatization and its sources. I find that stigmatization and discrimination are more contextualized today, varying by social situation and workplace environment.



ZACH KRIBS, '15
How Should I Think About This?
The Importance of Multiple Perspectives for Indecisive Individuals When Performing Divergent and Convergent Thinking Tasks

Faculty Sponsor: Mareike Wieth
 Majors: Psychological Science, Music
 Hometown: Mason, Mich.

Indecisive individuals seek out more information than decisive individuals when making a decision (Germeijs & De Boeck, 2002). It is therefore possible that indecisive individuals may feel more comfortable and perform better when multiple perspectives about a topic are presented, as is traditionally the case in a liberal arts environment. This study examined whether indecisive individuals' thinking is influenced differently when primed with a single perspective versus multiple perspectives.

Seventy participants completed an indecisiveness questionnaire and read one of two essays that primed them to think about an ethical topic from a single or multiple perspectives. Participants then completed the Remote Associates Test (RAT) (Mednick & Mednick, 1967), to assess their convergent thinking, and the Guilford's Alternative Uses Task (1967), to measure their divergent thinking. For the RAT, participants were asked to find a word that can be combined with three

given words to make a new word or phrase (e.g., nail, food, puppet—finger nail/finger food/ finger puppet). To assess divergent thinking, participants were asked to list as many creative uses as possible for two items: a newspaper and a paperclip. Statistical analyses were conducted to assess the impact of indecisiveness, priming, and their interaction on convergent and divergent thinking scores. Results show that indecisive participants have greater thinking scores when given the multiple perspectives prime (the prime simulating a liberal arts environment) than when given a single perspective prime.

These findings indicate that indecisive individuals may actually thrive more in a liberal arts environment than in an environment that tries to focus their thinking on one perspective.



ADAM KUDIRKA, '15
The Role of Monocyte miRNA in Rheumatoid Arthritis

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

Rheumatoid arthritis (RA) is a chronic inflammatory disease affecting the synovial tissues of joints. RA is a multifaceted disease involving many different cell types of the immune system, such as T cells, B cells, macrophages, and monocytes. One of the hallmarks of RA is up-regulated angiogenesis, or the formation of new blood vessels from old blood vessels. Pro-angiogenic mediators such as TNF- α , vascular endothelial growth factor (VEGF), and many more have been found to play an important role in RA (Maruotti, 2006). However, the body is able to regulate angiogenesis through anti-angiogenic factors to ensure the proper amount of angiogenesis is taking place. One way that the body is able to regulate angiogenesis is with microRNAs (miRNAs). miRNAs are able to regulate genes by degrading messenger RNA (mRNA) or inhibiting translation from taking place (Rebane, 2013). miRNAs have been proven to play a vital role in RA pathology. There have been many miRNAs found to be abnormal in RA tissue; however, the role of many of these miRNAs in RA is still unknown (Ammari, 2013). It is the goal of this study to investigate the role of several of these miRNAs produced by monocytes under both normal and inflammatory conditions to expand on our knowledge of this topic.

Supported by: FURSCA

ALEX KULIGOWSKI, '16

(See Albion Accelerator Projects: Makerspace)



ALICE LALONE, '16
**The New Albion Community Food Center:
 A Partnership for Better Nutrition**

Faculty Sponsor: Dan Skean
 Majors: Biology, Business and Organizations
 Hometown: Ortonville, Mich.

According to the USDA, a food desert is defined as “urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food.” Although Albion, Michigan, may not qualify as a food desert because it has one dedicated grocery store with fresh produce and meats, and a seasonal farmers’ market, access to healthy food is limited by income (according to 2013 U.S. Census Bureau estimates, 38.7% of Albion residents live below the poverty level) and competition from at least 17 other stores or fast-food chain restaurants that all provide calories with a greater convenience factor.

This past year, I have been working with the new Albion Community Food Center, which will be located at 112 E. Erie Street. The center is a food hub that includes a shared-use commercial kitchen to be used as a business incubator (the One12 Kitchen), a store that sells shelf-ready products largely from the kitchen (One12 Store), a market-house that essentially is a winter farmers’ market (One12 Market House), and a network that puts local farmers in touch with institutional buyers seeking locally-sourced produce (One12 Aggre-center). Customers coming to buy from the market or store can use Double Up Bucks, Food Stamps, and WIC Coupons. This will help to encourage people to purchase the fresh and local produce as well as make it much more affordable. It is hoped that the food center will enhance the community’s nutrition and culture, and facilitate more business opportunities in Albion.

ROB LAMB, '15

(See Albion Accelerator Projects: Post-Baccalaureate Program)

HANNAH LITVAN, '15

(See Albion Accelerator Projects: Artists’ Cooperative)



CORBIN LIVINGSTON, '16
**Synthesis, Characteristics, and
 Catalytic Application of Bare-Palladium
 Nanoparticles on Carbon Microsphere
 Composites**

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

The Metz group has successfully found a new method, ultrasonic spray pyrolysis, to synthesize carbon microspheres to act as supports for

palladium nanoparticles that are used as catalysts in hydrogenation reactions. The Harris group has been using palladium nanoparticles supported on polymeric membrane as catalysts for hydrogenation reactions. These membrane supports have many shortcomings, particularly solvent compatibility, which limit their application. The use of carbon microsphere-supported nanoparticles should circumvent these limitations, allowing me to run hydrogenation reactions in different solvents and both compare and expand on the results of the Harris group.

Supported by: FURSCA

PATRICK LOPEZ, '15
**Misreading Russia: Russian Strategic Culture
 and the Ukraine Crisis**

Faculty Sponsor: Andrew Grossman
 Major: Political Science
 Hometown: Boise, Idaho

As events have unfolded in Ukraine, many theories as to why Russia has acted so aggressively have been bandied about. My area of interest is in deciphering the Russian “strategic culture”—a combination of political and security elements that can serve to explain the actions of a nation in a geopolitical context.

The strategic culture creates a strategic image, a notion of the state that informs its decisions and relationships within the international system. The construction of this image involves input from actors within the state, as well as external actors. Internally, there are many aspects to Russian political culture that can be examined, but my primary area of interest is in Russian nationalism and its effects on Russian foreign policy. Regarding external actors, it is my contention that Russia has been treated as the “loser” of the Cold War and that the West has continually treated Russia as a second-rate power, regardless of its vast wealth, powerful military, cultural heritage, and sheer size. This treatment is evident in several key areas: the economic response by the West to the problems of the former Soviet Bloc states, the expansion of NATO, and now our potential meddling in the Ukraine. The paper and presentation will help to make clear the interactions between these elements, and help Western audiences understand why the combination has expressed itself as an aggressive foreign policy.

ELENA LUCE, '16

(See Albion Accelerator Projects: Day Care)

LIQI LUO, '15

(See Albion Accelerator Projects: Post-Baccalaureate Program)



TAYLOR MACIELAK, '15

(See Albion Accelerator Projects: Post-Baccalaureate Program)



SHANTI MADHAVAN, '15

Easy Does It When Starting an Exam: Order of Difficulty and Exam Performance

Faculty Sponsors: Andrea Francis, Mareike Wieth

Major: Psychological Science
Hometown: Onsted, Mich.

Teachers can help students learn by tailoring the presentation of topics being taught and instructing appropriate study methods (Shulman, 1986). For example, a math teacher knows that addition is easier than subtraction, so addition is taught before subtraction. Additionally, teachers can show students how testing themselves leads to better performance than simply rereading (e.g., Roediger & Karpicke, 2006). Whereas previous research has clearly shown that testing oneself improves performance, no formal study has investigated whether the order of topics can impact learning. This study is therefore designed to test whether assessing students on easy topics before hard topics enhances overall performance while taking into account different study methods.

Participants read and studied three paragraphs of varying difficulty. (Karpicke & Blunt, 2011). Participants studied one paragraph by rereading, one by recalling, and one by reflecting on their previous knowledge (the latter two are consistent with the idea of testing oneself). Afterward, participants answered eight open-ended questions per paragraph.

We performed an analysis of covariance that first controlled for how much participants generally study and for the study method used for each paragraph before examining whether order of topic difficulty had an impact on overall scores. Results showed that participants who were tested on the easy topic first performed better overall than participants who started with a difficult topic. This suggests that no matter how a student studies and how many hours they study, the order of the topics on a final assessment can impact overall scores.

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

JULIA MALECKE, '17

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



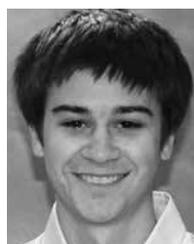
VICTORIA MALUS, '15

Genetic Ancestry and Social Identities: Investigating My Family's Heritage Using Direct-to-Consumer Genetic Tests and Oral Histories

Faculty Sponsor: Bradley Chase
Major: Anthropology
Hometown: Holland, Mich.

Using data generated by direct-to-consumer genetic tests in conjunction with family oral histories, I explore the relationship between biological and social identities using my own family as a case study. To research my genetic ancestry, I submitted samples of my DNA to three different direct-to-consumer genetic testing services: 23andMe, Ancestry.com, and National Geographic's Genographic Project. To research my social identity, I created a comprehensive family tree and interviewed family members to learn more about their understanding of our cultural heritage. The two forms of research corroborate one another to a significant degree, but with one major difference that I will be speaking about in my presentation. Through this process, I have concluded that both biology and culture are integral to the construction of an individual's identity and have gained an enriched understanding of my family's history.

Supported by: FURSCA—Harriett E. Elgin, '36, Science Fellowship



JACK MANQUEN, '15

The Role of NEK2 and PKN1 Kinases in Cancer

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

The primary objective of my project was to identify the effect of potential kinases on p53, the tumor suppressor protein. Normally, active p53 inhibits cell division at certain points in the cell cycle to prevent cells from continuously dividing and causing cancer. In many cancers, p53 is inhibited allowing cells to pass the checkpoints in the cell cycle and constantly proliferate. p53 can be inhibited via many different mechanisms including phosphorylation which is controlled by kinases. The lab that I worked in focused entirely on these kinases and how they affected p53 activity. I studied NEK2 and PKN1, the best candidate kinases of p53. These kinases were shown to phosphorylate p53 *in vitro* but had not been studied in actual cells. My project was to create kinase dead mutants of these potential p53 kinases and study their effect on p53 activity in human carcinoma cells. Preliminary data indicates that NEK2 wild type kinase decreases the activity of p53 within cells while the NEK2 kinase dead mutant lacks this suppressive activity.

Supported by: SMART Program, Baylor College of Medicine



Mattson

ANDREW MATTSON, '17

Major: History
Hometown: Davisburg, Mich.

JACOB TERBERG, '18

Major: History
Hometown: Commerce Township, Mich.

Curating Controversy: Creating a Digital Exhibit of Racist Images

Faculty Sponsor: Marcy Sacks

Our project will examine American race relations between the fall of Reconstruction in 1877 and the early twentieth century through the prism of a specific set of lithographs housed in the Albion College archives. These images, produced in the late nineteenth century by Currier & Ives, are known as the "Darktown Comics," a wildly popular, racist series. The lithographs offer a window into the evolution of racism in the

post-Reconstruction era; by focusing on the "Darktown Comics," we explore the cultural manifestation of racism and unravel the ways that cultural disdain undergirded whites' defense of their own supremacy.

Through this display, we hope to foster awareness of continued racism and the recognition that although slavery had been abolished, that reality did not eliminate a widespread belief in black inferiority. These lithographs ridiculed blacks' efforts to become full-fledged citizens by suggesting that they were making hapless attempts to engage in elite [read "white"] activities and failing miserably, to great comic relief. The lithographs also reveal whites' fear that black freedom would lead to a complete disintegration of society and civilization.

We have been researching the lithographs, cataloguing their metadata, and learning their historical context; ultimately, we will construct a digital exhibit for public consumption using the program Omeka. Today's presentation will detail the process of our work, share some of the material we have been using, and explain the significance of displaying it in an exhibit.

Supported by: Mellon Humanities Lab

**ANDREW MATTSON, '17**
The Historical and Cultural Significance of Sports in Currier & Ives' Racist "Darktown Comics"

Faculty Sponsor: Marcy Sacks
Major: History
Hometown: Davisburg, Mich.

My project will examine American race relations in the cultural context of sports in the late nineteenth century. I will focus on the sports-themed subset of Currier & Ives' racist "Darktown Comics," specifically those featuring horse-racing, baseball, and boxing.

Sports took shape during this period as a representation of manhood; for example, boxing was known as "the manly art." The great success of black athletes like Isaac Murphy and Moses Fleetwood Walker became increasingly problematic to white Americans in an era in which blacks were swiftly being excluded from full participation in American life and citizenship. These cultural manifestations of racism in the social atmosphere of sports will help create context to the "Darktown Comics" as a whole, and will unravel the ways that cultural disdain undergirded whites' defense of their own supremacy.

Through this analysis, I hope to foster awareness of continued racism and the recognition that although slavery had been abolished, that reality did not eliminate a widespread belief in black inferiority. These lithographs ridiculed blacks' efforts to participate in athletic endeavors by suggesting that they were making hapless attempts to engage in elite [read "white"] activities and failing miserably, to great comic relief. The lithographs also reveal whites' fear that black freedom would lead to a complete disintegration of society and civilization.

Today's presentation will detail the sports-themed subset of the greater "Darktown" exhibit, share contemporary and period perspectives on the material, and explain the significance of displaying it in an exhibit.

Supported by: Mellon Humanities Lab

**ALLISON MCCLISH, '15*****Wolbachia* Infection Frequency and Cytoplasmic Incompatibility in a Michigan Population of *D. melanogaster***

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

In some species of *Drosophila*, *Wolbachia* infection results in an effect known as cytoplasmic incompatibility (CI). This effect inhibits the viability of offspring produced from the mating between an uninfected female and an infected male. Because *Wolbachia* is transferred through the mother to the offspring, this effect gives a reproductive advantage to infected females, thus raising the infection frequencies of *Wolbachia* throughout the population. In *D. melanogaster*, this effect has been found to be overall minor or nonexistent, and in general this species has a lower infection frequency than *D. simulans*, which has been found to evidence a very strong CI effect. In a study of a Michigan population of *D. mel* in 2012, a very high infection frequency was found.

In order to explain this high frequency, *D. mel* from this location were tested for CI over the next year. Three different sets of flies were tested, including originally wild-caught stocks that had been in the lab for several months, freshly caught flies, and the first-generation



offspring of wild-caught flies. In these tests, infected males were crossed to uninfected females and the percentage of eggs hatched calculated. In each of the three sets, a factor potentially inhibiting CI expression in the former set of crosses was fixed; however, no CI effect was ultimately shown, indicating that CI is not responsible for the high infection frequency in Michigan *D. mel.*

Supported by: FURSCA

TRENTON MIKEK, '15

(See Albion Accelerator Projects: Post-Baccalaureate Program)

TRENTON MIKEK, '15

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



EMILY MORLOCK, '15 Understanding the Role of Psychotropic Medications in the Treatment of Post-Traumatic Stress Disorder

Faculty Sponsors: Barbara Keyes, Eric Hill
Major: Psychological Science
Hometown: Ionia, Mich.

This project investigated the consequences of using psychotropic medication (specifically, anti-anxiety drugs) in association with cognitive-processing therapy (CPT) for combat veterans diagnosed with post-traumatic stress disorder (PTSD). Anti-anxiety drugs, such as benzodiazepines, are prescribed over 30% of the time for veterans with PTSD, though no data currently support the efficacy of benzodiazepines on core PTSD symptoms: avoidance, hyperarousal, numbing, and dissociation (Lund, Bernardy, Alexander, & Friedman, 2012). Benzodiazepines have been shown to have a negative impact on veterans' PTSD treatment outcomes when compared to a control group taking no medication during treatment; however, these studies have failed to provide reasons as to why these medications may be ineffective (Rothbaum, Price, Jovanovic, Norrholm, Gerardi, et al., 2015).

The present research included a comprehensive literature review of both neurobiological and psychological perspectives in order to develop hypotheses as to why psychotropic medications have been reported as ineffective during treatment for veterans with PTSD.

Supported by: FURSCA—Orpha Leiter Irwin Research Fellowship in Pre-Medicine



PAXTON MUELLER, '15 The Mathematics of Sofya Kovalevskaya

Faculty Sponsor: Darren Mason
Majors: Mathematics, Economics and Management
Hometown: Monroe, Mich.

Sofya Kovalevskaya was a Russian mathematician who made important contributions in her field during the nineteenth century despite obstacles she faced as she resisted the typical role of women during the time. One of her most famous contributions is a generalization of Cauchy's existence theorem for partial differential equations. Known today as the Cauchy-Kovalevskaya theorem, her work greatly improved Cauchy's proof. The theorem establishes existence and uniqueness of solutions to systems of partial differential equations that meet the criteria of a Cauchy initial value problem. Although this theorem is very useful in studying partial differential equations, due to its complexity it is rarely covered explicitly in undergraduate courses. To make the theorem more accessible, I have simplified and reduced the general multidimensional case of the Cauchy-Kovalevskaya



KELSEY MILLER, '15 The Impact of Social Forces on the Development, Course, and Duration of Personality Disorders

Faculty Sponsor: Scott Melzer
Majors: Psychological Science, Philosophy
Hometown: Alma, Mich.

Personality disorders have long been considered by the psychological community to be lifelong conditions that cause distress or deviation in the lives of those affected. Careful examination of cross-cultural research suggests that these disorders may not be as enduring as presumed, which suggests that forces external to the individual exist which impact the onset of the disorder, and which renders the disorders the responsibility of society to rectify. This project analyzes sociological and psychological research on personality disorders, offering an interdisciplinary theoretical synthesis of these phenomena as a possible explanation for the development of the disorders. I offer an overview of the distinctions between the two fields' conceptions of personality, self, and identity, followed by an application of sociological theory to the psychological concepts of disorders. The evidence suggests that social forces influence the development, course, and duration of personality disorders. The personality of a dysfunctional individual is impacted greatly by social forces and is neither intrinsic to the individual nor unchangeable.

theorem to a special two-dimensional case. This new version, which requires limited prior knowledge to be understood, dramatically improves the current place this interesting theorem occupies in the undergraduate mathematics curriculum.



SHANNON MURPHY, '17
Synthesizing Shaped Palladium Nanoparticles with Natural Reductants

Faculty Sponsor: Kevin Metz
 Major: Biochemistry
 Hometown: Midland, Mich.

Nanocrystals are defined as having at least one dimension between 1 and 100 nanometers. Interest in nanocrystals has been growing due to their variety of applications. One such area has been synthesizing palladium nanocrystals into a variety of different shapes, including cubes, octahedrons, and plates. The Metz lab has been working to synthesize palladium nanoparticles with specific shapes using coffee as the reductant. Using coffee is not ideal because a solution of coffee contains many different components that could act as the reducing agent. Because of this, it is unclear which specific component is acting as the reductant. In order to reduce the uncertainty of using coffee, reductants that only have one component that acts as the reducing agent (pure reductants) can be used instead to synthesize shapes with palladium nanoparticles. This is done by reducing a palladium ion solution over a period of several hours using resveratrol, pomegranate extract, grape seed extract, elderberry complex, and green tea complex, pure reductants. The nanocrystals are then isolated and analyzed by scanning electron microscopy. The latest results of this project will be presented.

Supported by: FURSCA



CANDACE MYERS, '15
Retribution, Reconciliation, and the Role of Religion in the International Courts: A Case Study of the Extraordinary Chambers in the Courts of Cambodia

Faculty Sponsor: Carrie Booth Walling
 Majors: Political Science, Religious Studies
 Hometown: Fraser, Mich.

Between 1975 and 1979, the ultra-communist Khmer Rouge ruled Cambodia. During their reign, the regime tortured citizens, starved and worked many to death, and engaged in mass killings as part of a state-sponsored project of genocide. The principal victims were members of the political opposition, ethnic minorities, and highly educated elite. For decades after the Khmer Rouge left power, Cambodia did not confront these crimes. During the early 1990s, the state was pressured to address the crimes of the past. After repeated negotiation, the United Nations and the state

of Cambodia created a new institution to address these crimes—a hybrid-tribunal housed in the Extraordinary Chambers in the Courts of Cambodia (ECCC). The ultimate aim of the ECCC was to hold perpetrators accountable through the use of trials. In the forming of the ECCC, Buddhist cultural needs of reconciliation were initially ignored, yet over time the institution evolved to better address the needs of victims, including their religion and culture.

Research on transitional justice shows that, after mass atrocities, societies must confront the truth of past human rights violations, craft policies aimed at institutional reform, and at times prosecute those deemed most responsible. Many in the field of transitional justice argue that justice and reconciliation can be achieved but through different mechanisms, trials in the case of the former and truth commissions for the latter. When states create these mechanisms, they choose to focus either on justice or reconciliation. However, when states focus on one or the other, the needs of victims are left unsatisfied and the broader society suffers. The ECCC is notable because it illustrates that reconciliation and justice can be achieved simultaneously, making the hybrid tribunal a model for future cases.

Supported by: FURSCA

KYLE O'GRADY, '17

(See Albion Accelerator Projects: Makerspace)



NIKHIL PATEL, '18

Majors: Biology, Economics and Management
 Hometown: Grosse Pointe Woods, Mich.

RACHAEL VITALE, '18

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

An Exploration of Circadian Rhythms in Crayfish

Faculty Sponsor: Tammy Jechura

Circadian rhythms, the physiological and behavioral rhythms that occur approximately every 24 hours, including sleep and activity cycles, can be studied and manipulated to determine how the environment interacts with an animal's physiology to allow it to remain synchronized with an environmental



Vitale

time cue, such as sunrise or sunset. In the laboratory, light cycles can be easily manipulated, and the effect on specific areas of animals' behavior can be studied intensely. In many cases, the resulting information can aid our understanding of how an animal fits a particular niche in its environment, possibly leading to better efforts to control invasive species and to protect native species. However, understanding the behavioral cycles



of animals can also lead to a better understanding of the human circadian system, which is the ultimate goal of this research.

The current study explores the basic circadian rhythms of several species of crayfish in an effort to describe similarities and differences in their activity cycles as well as to determine whether radiofrequency (RF) activity monitors are feasible in the study of crayfish circadian rhythms. Three species of crayfish were monitored with RF activity transmitters (Minimitter, Inc.) in LD 12:12 to establish baseline rhythms. Future work with these animals will include an examination of the length of time to recover from changes in the light environment, which will lead to the ability to use experimental methods to determine the effect of various environmental stimuli on the circadian system of crayfish.

JOSH PENDER, '15
Synthesis of Activated Palladium Nanoparticles (PdNPs) on Carbon Microspheres (CMs) for Use as a Hydrogenation Catalyst

Faculty Sponsor: Kevin Metz

Major: Chemistry

Hometown: Iron Mountain, Mich.

We have developed a method to fabricate composite material consisting of palladium nanoparticles tethered directly to high surface area, porous carbon microspheres. This approach is advantageous because metal nanoparticles have been shown to be effective catalysts. However, due to their small size, unsupported metal nanoparticles can be difficult to recover and reuse. A composite material, such as ours, allows for the isolation and reuse of the nanoparticles. Other procedures for fabricating composites call for the synthesis of nanoparticles in one step, then attaching them to a support in a second step. Our approach circumvents this second step, saving time and energy. Here we present results of the fabrication and characterization of our composite materials. To demonstrate the utility of our nanoparticles as catalysts, we employed the hydrogenation of methyl trans-cinnamate as a model system.

Supported by: FURSCA

ALEX POOL, '15
Albion College Student Health Study

Faculty Sponsor: Heather Betz

Major: Biochemistry

Hometown: Linden, Mich.

College is a time when many health habits, both physical and behavioral, start to form that will remain throughout one's adult life (Kemper & Welsh, 2010). Understanding the physical and behavioral make-up of a college population allows for more focused interventions, i.e., more physical activity classes,

increased information on healthy eating, smoking cessation classes, or competitions to encourage the reduction of screen time and sedentary behaviors. Currently, the prevalence of overweight and obesity among adults in the United States is 68% (Flegal, Carroll, Ogden, & Curtin, 2010). It is estimated that 32% of college students are overweight or obese (Wilson, Gallivan, Kratzke, & Amatya, 2012). Physical inactivity, poor nutritional habits, and time spent in sedentary activities are just some factors that play a role in the problem of overweight and obesity in both the college population and the overall adult population.

The Albion College Student Health Study examined many of these factors, including physical activity patterns, sedentary behavior, knowledge of physical activity and nutrition guidelines, the amount of time spent sleeping, blood pressure, waist circumference, smoking, and convergent and divergent creativity. A total of 64 Albion College students (39 males, 25 females) participated in the study, allowing for the continuation of research started last year, but also for examination of new variables of health and wellness that can aid in planning for future programming at Albion College.



OLIVIA POTOCZAK, '15
The Climate Pickle: True Stories about Climate Change for the Millennial Generation

Faculty Sponsor: Nels Christensen

Major: English (Creative Writing)

Hometown: Birmingham, Mich.

My departmental honors thesis evolved out of a FURSCA project where I first explored, researched, and employed creative nonfiction to talk about climate change, specifically targeting people in and around the college age. In order to actually reach my audience, I created a blog—theclimatepickle.com—where I have been publishing blog posts twice a week since September 2015. The research process included reading successful climate and environmental blogs, such as grist.org and dotearth, to understand the form of writing and why it is important, staying current on new developments related to climate change in the news and scientific community, and using social media, such as Facebook, Twitter, and Instagram, as tools to build a community of readers for my blog, rather than letting my words gather dust on a shelf.

In a literary sense, the goal of my thesis is to put the human into the climate change story—to evoke human emotion amongst scientific fact. And the blog platform allows me to know how my audience is reacting to my work, true stories about climate change. The language and other elements are more casual than an academic paper because the posts are by me, a Millennial, talking to my peers, the Millennial Generation, about what is happening to our earth and what that means for us.

KAITLIN PYTLESKI, '15

(See Albion Accelerator Projects: Makerspace)

ELLE ROOT, '17

(See Albion Accelerator Projects: Community Arts Center)

that includes coffee as the reducing agent. The carbon microparticles were characterized by FTIR spectroscopy and imaged using scanning electron microscopy. Bacterial viability tests were conducted to examine the success of the silver nanoparticles against *E. coli* and *Bacillus cereus*. Characterization of the filtration capacity is ongoing. Our most recent results will be presented.

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

OLIVIA SAVAGE, '17

(See Albion Accelerator Projects: Community Arts Center)

MCKENZIE SCHAFER, '15**Story of Strength: Two Arias from an American Opera**

Faculty Sponsors: Samuel McIlhagga, Maureen Balke
Major: Music Performance (Vocal)
Hometown: Marshall, Mich.

The opera *Susannah* associates itself with the apocryphal story "Susannah and the Elders." This adaptation is located in New Hope Valley, Tennessee and is placed in the 1950s. A young lady, Susannah, is longing and determined to leave the valley and experience the culture outside of the Tennessee mountains. At the beginning of the opera, Susannah is bursting with hope, strong will, and thoughts of new cultural experiences. The first aria, "Ain't it a pretty night?" exemplifies how deeply she experiences these ambitious emotions.

As the opera progresses she is falsely accused of being a seductress, which then leads to cruel judgments and shunning from the traveling preacher, the Elders, and her community. After being singled out she finally loses the strength to fight for her innocence, and this is when she sings the second aria, "The trees on the mountains." The community's misjudgment has numbed her heart. This folk song is the only way Susannah can express the deep despair she is truly experiencing, and unfortunately the abuse continues after the aria until Susannah regains the strength she had to speak out against her community. This opera exemplifies many related stories women have or will experience all over the world, and this opera also shows the immense strength and beauty these women have gained from pushing forward to make a better life for themselves.

DOUG SCHOMER, '16

(See Albion Accelerator Projects: Community Arts Center)

SARA SAMPLE, '15**Tout Ce Qui Est Vieux Redevient Nouveau: Farming Practices Old and New in France and America**

Faculty Sponsor: Andrew French
Majors: French, Sustainability Studies
Hometown: Sterling Heights, Mich.



Traditional farming in France is different than most forms of farming that go on in France today. The traditional farming system was often based on conservation of land and resources and is somewhat associated with the serf system that existed early in French history. Industrial farming was, and still is, very popular in France, but the organic farming movement is changing some farmers' views on the way that things are grown. Differing viewpoints of farmers and consumers on the organic farming movement are of interest because most only think of the positive aspects of this system. New, as well as some old, distribution systems are helping facilitate more sustainable growing techniques. These systems include a "vente directe" way of selling produce, as well as changes in the way subsidies are given to farmers by the French government. Farming in France has been contrasted in many ways with farming in the United States, but in some ways the systems have learned things from each other. This presentation will contrast current and traditional farming practices in France with those in the United States.

MICHELLE SAMSON, '15
Carbon Microparticle and Silver Nanoparticle Synthesis for Filtration of Heavy Metal in Water

Faculty Sponsor: Kevin Metz
Major: Biochemistry
Hometown: Allen Park, Mich.



The application of composite materials has been useful in the development of water filters. Here, silver nanoparticle-carbon microsphere composites were formed for examination in water filtration applications. Carbon microparticles were synthesized using various biological materials, including excess byproducts such as corn husks and sawdust through the process of hydrothermal carbonization. Silver nanoparticles were synthesized on the surface of the carbon microparticles by a three-step process



JOHANNA SCHULTE, '15
**The Patriarchy of Welfare Reform:
Legislating the Nuclear Family Model**

Faculty Sponsor: Trisha Franzen
Majors: Public Policy, Women's Studies
Hometown: Grand Rapids, Mich.

Poverty is an important, but often overlooked, problem in our society. The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) was enacted in 1996 and continues to be in effect today. The law established TANF (Temporary Assistance for Needy Families) and a system of block grant funding based on a state's willingness to adequately address the goals outlined in the law. PRWORA is a recent historical reflection of a political ideology surrounding poverty and its causes and consequences. The law very specifically promotes a certain family structure as a means for reducing dependence on government assistance. The hetero-normative nuclear family model is an example of the lingering socially constructed expectations of gender and sexuality reflected in public policy. PRWORA upholds the nuclear family model because of an unsubstantiated assumption that this ideal family model will inherently reduce government dependence and poverty.

My paper will research the complicated relationship between welfare reform and gender, sexuality, and family structure. I discuss various provisions of the bill and analyze them through a critical feminist lens. I focus on the qualitative messages the bill sends. I analyze both the political environment that led to the enactment of the law and the consequences of the law almost two decades later.

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

JESSICA SCOTT, '16

(See Albion Accelerator Projects: Day Care)



KATE SEARS, '16
**Web Coding: What Is It and What
Is It Good For?**

Faculty Sponsor: Megan Kudzia
Major: Psychological Science
Hometown: Ann Arbor, Mich.

Every day we reap the benefits of using websites and apps created by web designers and programmers. As students and faculty, we depend on the Internet to supply us useful information, and we expect it to be readily available. I'll be explaining the technical side of a website and the languages that are used to create such "magic," including HTML, CSS, JavaScript, etc. These languages can be difficult to understand;

however, with dedication, and someone to explain them in English, they can be mastered even if you're not a computer science/math person. My work in the library for the past three years has provided me insight on the importance of learning how to code, and I have applied my knowledge in a variety of fashions in my other academic areas. I'll also discuss other future projects and ideas in the works to bring more positive change and involvement for Albion students and faculty. In summary, I will be demystifying the "magic" of the Internet.

Supported by: FURSCA

KATE SEARS, '16

(See Albion Accelerator Projects: Community Arts Center)

CHANCE SEELY, '15

(See Carl Jones, '15, Chance Seely, '15)

KATHERINE SEXTON, '15
**Confirmation of the Role of sJAM-C in Monocyte
Migration via the Erk Pathway**

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

Rheumatoid arthritis (RA) is a chronic disease characterized by inflammation of synovial tissue. Changes in the synovium increase blood vessel formation allowing for a greater number of inflammatory cells to migrate to the synovium. Adhesion molecules, cell surface molecules, are responsible for many physiological processes of cells including cell migration. Junction adhesion molecules (JAMs) have been found in soluble form and have been shown to play a role in monocyte migration. Soluble JAMs (sJAMs), particularly sJAM-C, are significantly elevated in RA and bind to the receptor Mac-1. Based on this information we hypothesized that sJAM-C played a role in monocyte migration and that the migration occurred via the Erk pathway. In order to test this hypothesis, THP-1 cells were cultured and then *in vitro* chemotaxis assays were run.

Supported by: FURSCA



MEGAN SHERIDAN, '16
Synthesis and Characterization of
Ribonucleic Acid Aptamers Targeted
at *Aspergillus* Fungus 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 immune-suppressed patients. RNA aptamers may aid in the detection of aspergillosis using the cell surface carbohydrate, beta-D-glucan. The aptamers would be selected to bind selectively to cell surface carbohydrates of the fungus, where positive signals would be useful in the identification of infection. This work will describe isolation of RNA aptamers from a randomized sequence population of 10^{20} to 10^{24} variants. RNA aptamer pools were synthesized using PCR amplification reactions to combine the DNA template with primers. *In vitro* transcription was conducted to form the RNA molecules, where selection was conducted in rounds against beta-D-glucan. Sequencing and binding assays will be used to characterize the RNA aptamer pool. Five rounds of selection against beta-D-glucan have been completed. Ten to twelve rounds of selection against the cell surface carbohydrate will be completed before sequencing.

Supported by: FURSCA—Orpha Leiter Irwin Research Fellowship in Pre-Medicine

SHANTELLA SHERMAN, '15

(See Albion Accelerator Projects: Artists' Cooperative)



JOE SILVESTRI, '15
Developing a *Drosophila* Model for the
Study of Mumps Viral and Host Cell
Interactions

Faculty Sponsor: Kenneth Saville
 Major: Biology
 Hometown: New Hudson, Mich.

Drosophila melanogaster, the fruit fly, is a common model organism used for genetic study. In this experiment, the purpose was to take genetically modified flies that have viral protein DNA randomly inserted in their genome, and express this genetic information to study how the viral protein interacts with host cells within the fly. Stock fly lines were crossed multiple times to a special fly. These offspring expressed a specific, observable set of characteristics used to track the viral DNA insertion. My project will be to perform more specific fly crosses to try to express the viral protein in a specific tissue. In the future, further

analysis can be performed to determine the expression of the protein, with the possibility of testing different antiviral drugs to see if any effects on viral protein expression will change. This project is significant since it would be the first model system for the study of the mumps viral protein parts in *Drosophila*. Mumps viral proteins are common to influenza, and studying protein interactions provides an avenue to design new therapeutics to help treat these diseases.

Supported by: FURSCA—Upjohn Student Summer Biology Research Endowment



VICTORIA SOCHOR, '15
An Exploration of Apoptotic Mechanisms in
Cancer Cells Using Vanadium Complexes

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

Cancer is characterized by an over-proliferation of cells that are no longer within control of the cell cycle. Platinum chemotherapeutic agents have been used effectively in cancer treatment but with adverse toxic effects. Recent studies suggest that complexes using vanadium at various oxidation states have effectively slowed or inhibited cancer cell growth through many methods, including the activation of apoptotic pathways. Vanadium complexes (VCs) have also exhibited lower toxicity dependent on their oxidation state. We synthesized novel VCs possessing different functional groups for this study. We hypothesized that these VCs act to inhibit cancer cell growth via induction of the caspase 3/7 apoptosis cascade.

HT-29 and MCF-7 cell lines were used as models of colon and breast cancer, respectively. Three different VCs were used, each with unique functional groups (5-Br, 5-OMe, 3-OMe), that affected the electron distribution of the complex. Using cell proliferation assays, efficacy of each VC was assessed *in vitro*. VO_2 -Br was found most effective against both HT-29 and MCF-7 cell lines with 65.3% and 53.6% growth inhibition respectively. VO_2 -3-OMe was next most effective followed by VO_2 -5-OMe as the least effective at inhibiting both HT-29 and MCF-7 cell growth. Apoptosis assays were then performed on HT-29 cell lines using 5-Br to investigate possible growth inhibition mechanisms. There was no notable increase in caspase 3/7 activity of the treated groups compared to control groups. We found VCs to be effective at inhibiting growth of HT-29 and MCF-7 cell lines.

Supported by: FURSCA—Jane Seymour Kilian, '39, Endowed Fellowship

ROBERT SOMMERVILLE, '16

(See Albion Accelerator Projects: Makerspace)



KAITLIN SOPER, '15
Character Perspectives Explored through a Webcomic

Faculty Sponsor: Michael Dixon
 Major: Sociology
 Hometown: Warren, Mich.

While people have been telling stories for centuries, today's storytellers have an array of media at their disposal; television, the Internet, words, pictures, and animation have diversified how stories are shared. I have selected a handful of these varied resources to begin a multimedia webcomic that blends art, design, and simple animation into a narrative fiction to be consumed over the Internet. Webcomics are best compared to online graphic novels, but have higher flexibility in formatting. This allows me to create a narrative that does not rely solely on images and dialogue but makes use of more creative layouts.

I have chosen to use second person narration combined with stylistic images to push the reader into the perspective of each of the three young adult, female main characters. They each come from different cultures, occupations, and backgrounds, and these experiences have distinctly shaped their attitudes and perceptions. The artwork accompanying each character will reflect this, their internal struggles, and their personalities. For example, clean lines and analogous colors show the FBI agent's preference for order and stability, while messy edges and sharp angles express another character's anxiety surrounding the past adoption of her child. Through this method of storytelling I am interested in illustrating how cultures affect interactions and create boundaries, and the importance of communication and understanding in bringing people together.



LAURA STEAVENSON, '15
An American in Paris: Stories of My Summer in France

Faculty Sponsor: Judith Lockyer
 Major: English
 Hometown: Ann Arbor, Mich.

Studying the literature of the expatriate American writers, such as Ernest Hemingway, F. Scott Fitzgerald, and T.S. Eliot, has been an interest of mine for a number of years. I have spent much time reading their works and thinking about the way their lives as Americans living abroad after World War I influenced their writing. My interest in this subject became the inspiration to begin this creative project. During the summer of 2014 I had the opportunity to spend five weeks in and near Paris. I lived with two French families in order to learn about French culture, and took the opportunity to explore my own passion for writing.

My selection of creative nonfiction stories, *An American in Paris: Stories of My Summer in France*, offers a

glimpse at what life is like for a young American woman traveling abroad. Through months of writing, revising, and revisiting memories of my travels, I have explored ways to express my experiences through writing. The works of the early twentieth-century writers are an outcome of the inspiring environment they lived in, something that has inspired me to write my stories. The goal in writing my manuscript has been to grow as a writer myself, and to find a creative way to think about my time in France.



KATIE STRUNK, '15
A Markov Chain Analysis of the Monopoly Speed Die

Faculty Sponsor: Mark Bollman
 Major: Mathematics
 Hometown: Macomb, Mich.

The game of Monopoly is full of probabilistic factors that make the game interesting and fun to play. In 2007, Hasbro began to include a third die called the speed die with the purchase of the original Monopoly game. The speed die is a special six-sided die that features the numbers one, two, three, a picture of a bus, and two pictures of Mr. Monopoly. With the speed die comes the ability to move around the board faster, but it also offers players a choice that could alter the outcome of the game. I will demonstrate how a player can use this choice to avoid certain spots on the board, and how that strategy ultimately affects their time spent on undesirable spaces.



SAFIYA SYED, '16
miR155 Is Increased by Inflammation and Modulates the Expression of CD11a in Monocytes

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

Inflammation is a key process in innate immunity and helps drive the adaptive immune response. In addition, inflammatory mediators are often dysregulated in autoimmune diseases. Monocytes are key players in inflammation that reside in the blood and migrate into tissues to exert their effects. Adhesion molecules are molecules that are located on the surface of many cells and are necessary for monocyte migration. The adhesion molecule CD11a forms a complex with CD18, also known as lymphocyte function-associated antigen-1 (LFA-1), and interacts with intercellular adhesion molecule-1 (ICAM-1) to facilitate tight binding of monocytes to the endothelium. miRNAs are known to regulate gene expression in a variety of cell types and in response to various stimuli.

We hypothesized that inflammation regulates miRNA expression in monocytes and that these miRNAs

play specific roles in regulating adhesion molecule expression and monocyte migration. THP-1 monocytes were cultured and stimulated with TNF- α , and miRNA was isolated (n=6 replicates). cDNA was prepared and qPCR was performed using primers specific for miR155, miR181a, miR181c, miR15a, miR9-1, miR429, and miR466k. TNF- α stimulation increased the expression of all the miRNAs, except for miR9-1, which was not affected. miRNA inhibitors were then used to assess the role of these miRNAs in regulating the expression of CD11a. After confirming inhibitor specificity and efficiency, we found that the inhibitor of miR155 reduced the expression of CD11a mRNA by 93%. miRNAs are inducible by TNF- α in THP-1 monocytes, and miR155 regulates the expression of CD11a.

Supported by: FURSCA—Kenneth Ballou Research Endowment for Biology



HOLLEY TAYLOR, '15

A Temporary Living

Faculty Sponsor: Helena Mesa
Majors: English (Creative Writing), History
Hometown: Fort Wayne, Ind.

E.L. Doctorow said, "Writing is an exploration. You start from nothing and learn as you go." Writing offers humans

a way to make sense of the world around us as well as our place within the world. Writing in every form allows for this sort of discovery, but memoir offers a unique glimpse into these ideas. Memoir works with memory, and all its challenges, while exploring the one person's smaller experiences in order to show that her experiences often mirror the experiences of a larger "us." I chose to work within this genre to explore the nature of memory and consider ideas about the wider world and my small place in it.

My memoir collection, *A Temporary Living*, explores what it is like to be on the cusp of a significant change; it considers the transition into adulthood and the problems and joys that offers.

The essays explore changes in family dynamics, both in terms of the roles each member plays and the relationships between members. The collection also meditates on the uncertainty of the future, both my own and my family's, and the fear that kind of uncertainty can bring. As perceptions and knowledge change, we must learn to deal with these changes and work to reconcile the differences. This project has allowed me to experiment with the challenges and advantages of working on a larger project while helping me to improve my skills as a writer.

JACOB TERBERG, '18

(See Andrew Mattson, '17, Jacob Terberg, '18)



GLENN TIGNER, '15

Description of a Remarkable Occurrence of Fossil Turtles from the Eocene of Wyoming

Faculty Sponsor: William Bartels
Major: Geology
Hometown: Holt, Mich.

This study describes a remarkable accumulation of fossil emydid turtles from

Wyoming. The fossils are from the Bridgerian middle Eocene (about 50 million years ago). They were excavated from the Bridger Formation, a 200-meter unit consisting of pastel-colored mudstones and grey sandstones deposited in slow-moving meandering streams, lake-margin mudflats, and shallow lakes. The specimen was found in a floodplain or lake-margin mudstone with no evidence of burrowing or erosional scour.

The excavated block consists of at least 13 individual turtle shells distributed in four layers. All belong to



GRACE TALASKI, '17

Concerto for Clarinet and String Orchestra, Aaron Copland

Faculty Sponsor: Samuel McIlhagga
Majors: Chemistry, Music Performance
Hometown: Caro, Mich.

In 1947, "The King of Swing" Benny

Goodman commissioned a piece for solo

clarinet and orchestra from Aaron Copland, a composer known for his quintessentially American-sounding music including *Appalachian Spring* and *Rodeo*. Completed in October 1948, Copland's Concerto for Clarinet and String Orchestra consists of a slow, dream-like first movement joined by an extensive, technically demanding cadenza to a swift-paced second movement evocative of the hot jazz that Benny Goodman is known for. Goodman first performed the concerto in November 1950, and since then the concerto has remained a beloved standard piece amongst clarinetists.

Personally, I have always loved listening to Copland's Concerto for Clarinet, but learning and performing this piece has been one of the greatest joys of my musical education. Of all the pieces I have learned, Copland's clarinet concerto is my uncontested favorite. This piece not only allows the soloist to show off the full range of the clarinet, from low to high, but also the full range of his/her expressive and technical ability. This concerto enables the soloist to both play lyrically and show off and wail! I will be performing the first movement, the cadenza, and the final coda. I hope that you enjoy this performance, and I invite everyone to hear the performance with orchestra on Sunday, April 26 at 4:00 p.m. in Goodrich Chapel.

Supported by FURSCA—Julia Robinson Burd, '31, Memorial Fellowship



the genus *Echmatemys*, six of the better exposed shells are *Echmatemys septaria*, six others are probably *E. septaria*, and one could possibly represent *Echmatemys wyomingensis*. Such an accumulation could be the result of: living turtles entering a hibernaculum (winter den) or aestivarium (drought den); living animals crawling into an alligator hole during a drought; dead animals or shells washing into an alligator hole during a flood after a drought; a sedimentary accumulation of shells into a scour during a flood; or turtle shells accumulating along a strandline of a lake (a common preservation process during Bridger deposition).

The shells are complete, a few limb elements are present, but no skull bones or vertebrae were found indicating a short interval of scavenging prior to burial. The shells are mostly upright with one sideways and one overturned and their long axes are randomly oriented. These observations generally refute the strandline, scour-fill, and denning hypotheses and support the alligator hole hypotheses.

Supported by: FURSCA, Lawrence D. Taylor Undergraduate Geology Research Fund, Department of Geological Sciences

DANIEL TRAUB, '16

(See Albion Accelerator Projects: Artists' Cooperative)



DAVID UTRATA, '15

Investigation of Best Practice Sustainability on American College Campuses

Faculty Sponsor: Allison Harnish
Majors: Anthropology, Sustainability Studies
Hometown: Bolingbrook, Ill.

Sustainability is much more than a buzzword; it implies a culture and a system of operations following best environmental practices and livability in human institutions. Albion College has taken steps in the direction of sustainability, including through our environmental academic programs and the Silver LEED® certified Science Complex renovation, but more work is needed to replicate sustainable activities in the future.

Other colleges in the GLCA have institutionalized sustainability advisory councils and sustainability plans into their college master plans to draw on the expertise of faculty members, students, and the campus community to tackle this responsibility. Some American universities have established themselves as leaders in best practice sustainability. Their experiences can indicate to us at Albion how to follow their examples and avoid mistakes of the past in doing so.

To learn from them, I engaged in textual analysis of these schools' public web content and conducted

interviews with critical personnel and student leadership to understand internal hierarchies and decision-making processes of environmental and cultural sustainability issues. I identified stakeholders and advisory roles these schools had created to respond and report to their administrations. I traced best practices for facilities, grounds, purchasing, campus leadership, and academics, as well as their interactions with campus administration. I investigated evidence of institutional memory in place to retain the mission and the drive of campus and community sustainability. My results will help structure and inform the burgeoning sustainability leadership here at Albion as they work to institutionalize our own plan and advisory council.

RACHAEL VITALE, '18

(See Nikhil Patel, '18, Rachael Vitale, '18)

RUOLIN WANG, '15

Invertebrate Paleontology of the Mississippian Michigan Formation, Bellevue, Michigan

Faculty Sponsor: William Bartels
Major: Biology, Paleontology (minor)
Hometown: Guiyang City, Guizhou Province, China

This study describes and analyzes the previously undescribed marine invertebrate fossils from the Michigan Formation and attempts to determine a precise age for the unit. The Michigan Formation is a limestone deposit exposed in quarries near Bellevue, Michigan. It was deposited during the Mississippian Period which is the fifth period of the Paleozoic Era and lasted from about 355 to 320 million years ago. At that time, Michigan was covered by a shallow seaway and was near the equator.

The Michigan Formation is exposed in the quarry floors of the Cheney Limestone Company where it is a homogeneous gray muddy limestone that is not used commercially. This differs markedly from its lithology near the edges of the Michigan Basin where numerous sandstone and gypsum interbeds occur and no fossils are known owing to the more evaporitic conditions.

The fauna is limited, and fossils are far more rare than in the overlying Bayport Limestone. The dominant fossils are brachiopods (clam-like marine invertebrates) with the large strophomenid *Orthotetes kaskaskiensis* being most common and small spiriferid *Anthracospirifer bifurcatus* somewhat rare. Other fossils found in this formation are two or more species of very rare bivalves (clams), abundant worm burrows, and single specimens of the conulariid (problematic cnidarian?) *Paraconularia*, the nautiloid cephalopod *Vestinautilus*, and the bryozoan (moss animal) *Archimedes*.

The presence of the two brachiopod species suggests a Chesterian rather than Meramecian age for the fauna, although the precise identification of each awaits

further analyses of the Late Mississippian brachiopods from central North America.

Supported by: FURSCA, Lawrence D. Taylor Undergraduate Geology Research Fund, Department of Geological Sciences, GLCA New Directions Initiative Grant (Bartels)



CASSANDRA WARD, '15
Childhood Imagined: The Relationship between Image and Text in Storytelling

Faculty Sponsor: Jessica Roberts
Majors: Art, English (Creative Writing)
Hometown: Ann Arbor, Mich.

In this thesis project, I am exploring the relationship between text and image

in storytelling, with particular attention to how an intended audience or genre affects formatting and design. The project consists of three parts: A picture book, a series of micro-fiction, and a piece of creative nonfiction, all of which are fully illustrated. Each part experiments with ways of incorporating text and image in order to produce meaning. Tied together by the joining of image and text, the parts of this project also explore aspects of childhood such as imaginative play and loss.

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



NICHOLAS WEBSTER, '15
Synthesis and Characterization of Deoxyribonucleic Acid Aptamers for β -D-Glucan Carbohydrates

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

This work explores the use of short randomized single-stranded DNA aptamers which have the ability to be selected to bind to molecular structures including DNA, RNA, protein, and carbohydrates. This work will focus on the selection of aptamers that show selectivity for the β -D-Glucan carbohydrate, a polysaccharide that has many roles in immunity, cholesterol metabolism, and infection. This work will act as proof of concept for targeting carbohydrates for future studies.

Supported by: FURSCA

CHELSEA WEISS, '15

(See Albion Accelerator Projects: Community Arts Center)

LINDSAY WEISS, '15

Sex Education and Teaching Consent: Implications for Sexual Assault Prevention

Faculty Sponsor: Lynn Verduzco-Baker
Majors: English, Sociology
Hometown: Allen Park, Mich.

Statistically, someone in America will be sexually assaulted every two minutes. These harrowing numbers, then, necessitate a conversation about what constitutes consent, particularly given the role of consent (or lack thereof) in sexual assault. This study proposes sex education as a forum for dialogue while examining attitudes towards sex and its place in school curricula. Given that consent is a complex and controversial topic, however, there are notable barriers to having the discussions which need to happen.

To better examine the opinions which could help or hinder these conversations, I interviewed parents and teachers about sex education and consent. The study includes an analysis of these findings as well as an analysis of contemporary Michigan laws regarding both sex education requirements and sexual assault. I found that the majority of participants did not consider consent as a part of sex education before the topic was introduced to them by the interviewer. However, once introduced, most are open and willing to have that discussion about consent, though attitudes vary about how it should be taught. This is compounded by differing ideas about how even to define consent. So, access to accurate information about consent is imperative according to my findings. Therefore, I discuss ways in which consent can be incorporated, not simply as a good idea, but as a necessary component of the ways in which we educate young people about relationships and sexuality.



ELIZABETH WHITE, '15
Eurocepticism in the European Union: A Case Study of the United Kingdom Independence Party

Faculty Sponsor: Andrew Grossman
Major: International Studies
Hometown: Rocklin, Calif.

The 2015 European parliamentary election was characterized by the unprecedented success of Eurocepticism, especially within countries such as the United Kingdom, France, and Italy. The United Kingdom Independence Party (Ukip) won a majority (27.5%) of the British vote claiming 24 seats in Parliament. For the sake of brevity, the greater part of this research will focus on the Euroceptic movement within the United Kingdom. While this recent ideological shift within the European Union is often attributed to the financial crisis in 2009, the reasoning behind it is far more complex. The recent success of the United Kingdom Independence Party can be largely attributed to the internal change in leadership with



Nigel Farage becoming the leader of the party. This increase in popularity of Ukip has also pressured the more traditional political parties in England to become more Eurosceptic. This research will also address the economic impact of the British membership within the European Union, and the potential costs and benefits of their withdrawal. In conclusion, the recent rise in popularity of Ukip is predominantly a political fad movement. While it has caused a shift within British politics as a whole, it is unlikely that their final goal, British withdrawal from the European Union, will ever be realized.

TYLER WHITE, '15

(See Albion Accelerator Projects: Artists' Cooperative)



MEGAN WICKENS, '15
Acquisition and Retention of Learning in the Earthworm

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

Earthworms have been shown to display escape behavior (Wilson et al., 2015), which allows animals to turn off or eliminate an aversive or harmful stimulus. Previous research (Watanabe et al., 2005) found that earthworms can display a behavioral response after transferring it to long-term memory. However, "long-term memory" is a relative term, with worms showing evidence of learning when tested 30 minutes after training yet not 24 hours later. The goal of the current study was to determine the rate at which earthworms learn an escape response and the length of time it remains in their memory.

Earthworms, *Lumbricus terrestris*, completed a four-hour training session using a master-yoked design. Both worms of a master-yoked pair were exposed to an aversive stimulus (bright light), but only the master worm was able to escape the light by crawling. Both worms were then tested in a one-hour session either 30 minutes, one hour, or 24 hours after their four-hour training session. It was predicted that the master worms would show escape and avoidance learning by increased crawling activity, which would ensure that the bright light remained off. Meanwhile, yoked worms were not expected to show evidence of learning; their movement during the retention session was predicted to be similar to their level of movement during training. Furthermore, evidence of learning was predicted to decline as the time between the training and retention sessions increased.

ELIZABETH WITKOWSKI, '17

(See Albion Accelerator Projects: Community Arts Center)

JULIE WOOD, '16

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



MELISSA WOODARD, '15
Sleep and Well-Being

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

College students face a number of obstacles to proper sleep hygiene, and this could have an impact on their overall college experience as much as on their day-to-day functioning. Previous research has shown that sleep is related to life satisfaction, job satisfaction, and quality of life (Pilchner, 1998). Studies have found a correlation between poor sleep, poor lifestyle habits, and lack of social support in college students (Cheng, Shih, Lee, et al., 2012). Another study found that financial stress and living situations, both common issues for students, negatively affect college students' sleep (Galambos, Howard, & Maggs, 2012).

The current study was designed to assess the relationship between sleep hygiene and satisfaction with overall college experience. We hypothesized that poorer sleep, including fewer hours of sleep and lower quality of sleep, would be correlated with a more negative view of one's college experience. Students were assessed for sleep quantity and quality using subjective and objective measures. Surveys were used to examine perceptions of sleep quality. Objective measures of sleep were obtained with Zeo sleep monitors, which use a headband worn while sleeping to collect data about sleep states through the night. Satisfaction with college experience was measured with a questionnaire that assessed satisfaction with various aspects of college experience.

Results revealed that individuals with better sleep hygiene also had higher college satisfaction levels. Further research should investigate whether poor sleep hygiene actually causes less satisfaction with college. If so, sleep education could possibly be used to increase the retention rate of students, and it could benefit students to understand the impact that their sleep habits have on their overall college experience.



CRISTINA YBARRA GARCIA, '15
Synthesis of Symmetrical Biphenyls Using Phenylboronic Acids and Manganese (III) Acetylacetonate

Faculty Sponsor: Clifford Harris
 Major: Chemistry
 Hometown: Jaén, Spain

We are trying to understand a new chemical reaction. Fifteen years ago the Harris undergraduate research group noticed that the oxidation of organoboronic acids gave homocoupled products in low to good yields. This meant that Mn (VII), a reagent widely known to break C-C bonds, was instead creating them. Years later the group was able to show that the coupling was most likely being caused by a by-product: Mn (III). Thus, arylboronic acids react with manganese (III) acetylacetonate to produce the corresponding coupled biaryl compounds. Now, a series of experiments has been conducted using substituted phenylboronic compounds to determine the efficacy of this homocoupling reaction with substituents in the ortho, meta, and para positions. This is basic research, but in the long run we hope to provide chemists with better methods for creating the materials on which we depend for modern life.

Supported by: FURSCA, Faculty Development Committee

EVAN YOUNG, '15
Formylation of Substituted Phenols Using Microwave Irradiation

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

The Duff reaction is commonly used to introduce a formyl group to an aromatic ring with hexamethylenetetramine (HMTA) as the carbon source. The purpose of this project is to efficiently produce mono- and dialdehydes by the Duff reaction from substituted phenols under microwave irradiation. The reaction was performed in a sealed tube placed in a CEM microwave reactor, and identification of the products was completed using NMR. The substituents of the phenols tested varied from the highly electron donating methoxy group to the highly electron withdrawing nitro group. Monoaldehyde formation with 4-methoxyphenol and 4-t-butylphenol produced high yields with only five minutes in the reactor. Monoaldehyde formation with 4-nitrophenol had yields of 56% and 57% for five and 15 minutes in the reactor. The dialdehyde formation reactions were done in the presence of a large excess of HMTA, and reactions with 4-methoxyphenol produced a mixture of the mono- and dialdehyde. The results of the reaction using a large variety of starting materials will be presented. Monoaldehyde formation via the Duff reaction in the microwave reactor is very successful while the dialdehyde formation is more difficult.

MARK ZEIGLER, II, '15

(See Albion Accelerator Projects: Makerspace)



SHUQI ZHOU, '16
Computer Simulation and Mathematical Analysis of Games Using Nonstandard Card Decks

Faculty Sponsor: Mark Bollman
 Major: Mathematics
 Hometown: Wuhan, China

For many gamblers and casino owners, mathematics is the main topic in discussions about casino gambling. Probability gives us a tool to predict how often an event will occur and can be used to determine the likelihood of obtaining certain results in a particular game. In order to assess some alterations to existing casino games, we focused on using a five-suited poker deck with five cards per hand and six cards per hand. In each case, we calculated the theoretical number of each poker hand, which produces a list of hands ranked from best to worst. These mathematical results were verified by computer simulation using DrJava. The program dealt three million hands and counted the numbers of each type of hands. Combining computer simulation and mathematical analysis, we got a list of hand rankings.

Supported by: FURSCA—Orpha Leiter Irwin Research Fellowship in Pre-Medicine



EMILY ZIMMER, '15
Twenty Years Later: Cohort Differences in High School Seniors' Academic Motivation and Aspirations for the Future

Faculty Sponsors: Holger Elischberger, Barbara Keyes, Suellyn Henke
 Major: Psychological Science
 Hometown: Portage, Mich.

We compared the survey responses of seniors from the class of 1994 ($n = 69$) at a racially and economically diverse Midwestern high school with those from seniors in the same district 20 years later ($n = 139$). The two main goals of the study were: (1) to examine cohort differences in indicators such as sense of optimism (potentially negatively affected by the recession) and perception of racial (in)equality at the school; and (2) to predict students' academic motivation and professional/educational aspirations for the future, respectively, from a range of characteristics of their home, school, and community-level environments.

We found cohort differences between school safety (e.g., the school is a safe place), school interpersonal support (e.g., teachers support students in areas other than academics), and racial equality (e.g., students of all races are treated equally). Although academic motivation and future aspirations were strongly



correlated, we found that we can better predict student's academic motivation than their aspirations. In both cohorts, students with more support from their parents and more support at school (e.g., having at least one adult at school who cares about them) were more motivated to achieve academically and had higher academic aspirations. For the 2015 cohort we found that support at the level of the community (e.g., having adults you can trust in the community) also predicted higher academic motivation and aspiration. These results suggest that interpersonal support from various sources may increase students' academic motivation, and thus potentially also indirectly influence their aspirations for the future.

Supported by: FURSCA

PATRICK ZIMMER, '15
Rape Culture as Portrayed through Film

Faculty Sponsor: Scott Melzer
 Majors: Sociology, Psychological Science
 Hometown: Dayton, Ohio

Physical and sexual violence is pervasive in films with some suggesting the depictions reflect and reinforce broader rape culture. Scholars have applied the term "rape culture" to societies which normalize, excuse, ignore, tolerate, or even condone rape and sexual violence. My research examines cinema over the past 25 years, focusing on depictions of physical and sexual violence in popular film. In media, women are frequently objectified for the pleasure of the audience or as a result of plot progression. Social learning theory, excitation transfer theory, and feminist theories of sexual violence are incorporated in my analysis to explain the causes and consequences of rape culture in film. I analyze 25 top-30 grossing films spanning from 1990 to 2015 to gather information about themes of rape culture. Analysis of films revealed themes of rape culture including dehumanization of women, incidence of stalking, and themes of isolation and control.

ALBION ACCELERATOR PROJECTS

Faculty Sponsors: Vicki Baker, Lynne Chytilo, Amy Rahn

The Albion Accelerator (AA) will be a physical space with facilities for various kinds of making, thinking, writing, and collaboration. The Albion Accelerator will be housed downtown on Albion's Superior Street (or nearby environs) in a space appropriate for uses determined by the needs and interests of the Albion community. Artists' studios for recent studio art graduates, a day care center for Albion College and the local community, spaces devoted to making/serving food, spaces for a bicycle collective/repair shop, a bakery, a brewery, a distillery, workshops for electronics or web developers, or an art gallery are all possible co-tenants. The architecture of the Albion Accelerator

should be based upon the foundational flexibility of the concept itself, allowing for the tenants and their facilities to change with the community's interests.

Albion Accelerator Projects: Artists' Cooperative



Daniel Traub, Shantella Sherman, Warner Ball, Alyssa Hendricks, Hannah Litvan, Aly Bates, James Hartley.

WARNER BALL, '15

Major: Art
 Hometown: Wellston, Mich.

ALY BATES, '16

Major: Economics and Management
 Hometown: Novi, Mich.

RILEY COON, '15

Major: Psychological Science
 Hometown: Portage, Mich.

JAMES HARTLEY, '15

Major: History
 Hometown: Birch Run, Mich.

ALYSSA HENDRICKS, '17

Major: Finance
 Hometown: Comstock Park, Mich.

HANNAH LITVAN, '15

Major: Art
 Hometown: Chicago, Ill.

SHANTELLA SHERMAN, '15

Major: Art and Art History
 Hometown: Albion, Mich.

DANIEL TRAUB, '16

Majors: Geology, Biology
 Hometown: San Francisco, Calif.

TYLER WHITE, '15

Major: Economics and Management
 Hometown: Mt. Pleasant, Mich.

An artists' cooperative is an independent arts organization jointly owned and controlled by its members. Here at Albion the goal is to have a large

gallery space, a sales/information desk, and potential space for visiting artists. Beyond the main floor, studios will be available for working members where tools and materials may be stored. The space within Albion will be in a locality frequented by the local population in order to attract the attention of the public as well as prospective members. A membership program for artists and those running the organization will be established to handle the day-to-day problems and general guidelines. There will be levels of memberships, broken into Full Gallery Members, Supporting Members, and Patron Members. A major goal of the co-op is to keep in contact with the Albion community. Open houses for the public will be hosted, and the gallery will remain open most days. A series of events over the course of the year will keep the public coming back to see new things as the co-op progresses. Classes, taught by teachers at the college or students, will be offered to students at the college, young children in the community, and the general populace. Such classes will generate revenue and thus support the co-op. Overall, this organization offers the chance to expand an artist's network, personally and professionally. The co-op also has the potential to bring the college and the community together in a way never seen before in Albion.

Albion Accelerator Projects: Community Arts Center



Back row: Matt Falls, Doug Schomer, Chelsea Weiss, Austin Christie, John Brownlow. Front row: Elle Root, Olivia Savage, Ali Hill, Elizabeth Witkowski.

JOHN BROWNLOW, '17

Major: Accounting
Hometown: Grand Rapids, Mich.

AUSTIN CHRISTIE, '16

Major: Art
Hometown: Brighton, Mich.

MATT FALLS, '17

Major: Business and Organizations
Hometown: Carsonville, Mich.

ALEXANDRA HILL, '16

Major: Art
Hometown: Royal Oak, Mich.

ELLE ROOT, '17

Majors: Art, Biology
Hometown: Alpena, Mich.

OLIVIA SAVAGE, '17

Major: Business and Organizations
Hometown: Macomb, Mich.

DOUG SCHOMER, '16

Major: Business and Organizations
Hometown: Troy, Mich.

KATE SEARS, '16

Major: Psychological Science
Hometown: Ann Arbor, Mich.

CHELSEA WEISS, '15

Majors: Biology, Psychological Science
Hometown: Chelsea, Mich.

ELIZABETH WITKOWSKI, '17

Majors: Business and Organizations, Finance
Hometown: St. Joseph, Mich.

Our goal is to show the impact and feasibility of having an accessible community art center for both the college and the community. We address costs and economic practicality, and the possible benefits of programs that promote the arts.

Albion Accelerator Projects: Day Care



Ashley Glenn, Alyssa Glenn, Maggie Cripe, Jessica Scott, Elena Luce.

MAGGIE CRIFE, '17

Major: Communication Studies
Hometown: Dowagiac, Mich.

ALYSSA GLENN, '17

Majors: Business and Organizations, Communication Studies
Hometown: New Hudson, Mich.

ASHLEY GLENN, '15

Major: Biology
Hometown: New Hudson, Mich.



ELENA LUCE, '16

Major: Accounting
Hometown: Ludington, Mich.

JESSICA SCOTT, '16

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

We are researching the needs of the Albion community related to child care and child-specific programming. Our main foci include finding the best practices for a full-day facility, after-school care, and drop-off capabilities. We are also looking into how to integrate this with the campus community to provide opportunities for students as well.

Albion Accelerator Projects: Makerspace



Ellery Ekleberry, Bethany Brooks, Alexis DeLand, Craig Keyes, Eric Guindi, Robert Sommerville, Kyle O'Grady, Mark Zeigler, Alex Kuligowski, Madeline Drury.

BETHANY BROOKS, '15

Major: Athletic Training
Hometown: London, England

ALEXIS DELAND, '17

Major: Art
Hometown: Saline, Mich.

MADELINE DRURY, '15

Major: Sociology
Hometown: Milford, Mich.

ELLERY EKLEBERRY, '18

Major: Art
Hometown: Fort Worth, Texas

ANTHONY GENNA, '16

Major: Business and Organizations
Hometown: Grosse Pointe Park, Mich.

ERIC GUINDI, '16

Major: Finance
Hometown: Northville, Mich.

CRAIG KEYES, '17

Major: Business and Organizations
Hometown: Chelsea, Mich.

ALEX KULIGOWSKI, '16

Major: Economics and Management
Hometown: South Lyon, Mich.

KYLE O'GRADY, '17

Major: Business and Organizations
Hometown: Clarkston, Mich.

KAITLIN PYTLESKI, '15

Major: Art History
Hometown: Rochester, Mich.

ROBERT SOMMERVILLE, '16

Major: Small Business Management (IDY)
Hometown: Grosse Pointe Park, Mich.

MARK ZEIGLER, II, '15

Major: Political Science
Hometown: Taylor, Mich.

A makerspace is a community-operated work space where people with common interests, often in computers, machining, technology, science, digital art, or electronic art, can meet, socialize, and collaborate. We believe that a makerspace would benefit both Albion College and the community. Utilizing the business and artistic skills of college students, we identified and analyzed operations of active makerspaces (space, staff, funding, etc.), identified best practices, and began to develop the foundation of a possible business model (e.g., what components/factors need to be addressed/accounted for as a precursor for a business plan) for a makerspace that would be in the downtown area of Albion.

Albion Accelerator Projects: Post-Baccalaureate Program



Alex Balavich, Ben Kolanowski, Rob Lamb, Lauren Daniels, Chantal Chuba, Liqi Luo, Trent Mikek, Sam Hier, Taylor Macielak.

ALEX BALAVICH, '18

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

CHANTAL CHUBA, '15

Major: Art History
Hometown: Grosse Pointe, Mich.

LAUREN DANIELS, '16

Major: Art
Hometown: Westland, Mich.

SAM HIER, '15

Major: Accounting
Hometown: South Lyon, Mich.

CHRISTINA JACKSON, '16

Major: History
Hometown: Indianapolis, Ind.

BEN KOLANOWSKI, '17

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

ROB LAMB, '15

Major: Accounting
Hometown: Southfield, Mich.

LIQI LUO, '15

Majors: Art, Economics and Management
Hometown: Chengdu, China

TAYLOR MACIELAK, '15

Majors: Business and Organizations, Communication Studies
Hometown: Clarkston, Mich.

TRENTON MIKEK, '15

Majors: Accounting, Business and Organizations
Hometown: St. Louis, Mich.

The Albion College post-baccalaureate program will cater to students who wish to enhance their knowledge of art in hopes of pursuing a professional career or graduate program. The one-year program will consist of a 32-credit curriculum that includes both studio and lecture-based electives. Portfolio development and critique sessions with the program director will be held weekly. Participants will be involved in a combination of course work and employment during the program.

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 the Gerstacker Institute'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



Student and staff participants in the 2015 International Entrepreneurial Exchange.



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.

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

ALYSSA GLENN, '17

Majors: Business and Organizations,
Communication Studies
Hometown: New Hudson, Mich.

RANDOLPH KARDAS, '16

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

NALYA ANDRIAMAMPITA

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

ALEXIS COTTREAU

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

MARIANNE LAFON

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

QUENTIN SOLOMIANSKI

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

Business is global and collaboration is key. The International Entrepreneurial Exchange gives emphasis to Albion's mission of putting thought into action; to take what we learn in class and actually put it into practice. Students in the class are tasked with creating a business proposal aimed at building a French concept and delivering it to the U.S. market. Our team of six has created a company called Bonne Cuisine.

Bonne Cuisine offers a French food catering service for businesses that want to promote a healthier lifestyle using authentic French recipes prepared with fresh and locally grown ingredients purchased daily.

The concept rests on the model of a five-star catering service mixed with an American food truck. Our idea proposes high-quality, healthy French food, created by French chefs, for customers accustomed to "eating on the go." In addition, we provide all the ingredients to cook your own French dish at home, as a do-it-yourself recipe. Customers can order cooked, finished meals to eat on the go and/or a basket of ingredients to cook at home.

Our mobile application allows for a convenient ordering process using a simple, customer-friendly interface. The mobile application allows customers to preorder, pay, and write comments about certain dishes. It also indicates the location of the food truck and the estimated arrival time for each delivery.

With our French delicacies, we hope to enlighten the lives of Americans who have not yet had the chance to experience the wonder of French food.

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

CAITLYN BERARD, '15

Major: Business and Organizations
Hometown: Troy, Mich.

ALEX CAREY, '16

Major: Communication Studies
Hometown: Birmingham, Mich.

JULIA MALECKE, '17

Majors: Business and Organizations,
Communication Studies
Hometown: Brighton, Mich.

CARINE ENGASSER

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

NANYANG JIAO

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

MARAIM KINKONDA

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

The purpose of our project is to create and develop a new product to be launched in the American market. The product must include up-to-date technology and must be distributed business-to-business. Our group of French and Albion business students worked to find a product that would improve current corporate wellness. Our product, Revive, is an enclosed reclining chair with options that allow the user to create his or her own relaxation experience, specifically in the workplace. To find out how to make a product that would best serve our customers, we interviewed potential consumers and asked what we could improve upon. We also sent out informal surveys to a wide range of possible

consumers to assess needs and wants for corporate wellness. Through our findings, we hope to create a product that will improve business profits by enhancing employee job satisfaction and overall wellness.

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

NICHOLAS DIMAGGIO, '16

Major: Communication Studies
Hometown: Bloomfield Hills, Mich.

TRENTON MIKEK, '15

Majors: Accounting, Business and Organizations
Hometown: St. Louis, Mich.

JONATHAN DUFOUR

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

STEVE GARNERI

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

Our task was to create a new product to be released to the U.S. market. This product had to include a technology component as well as be marketed on a business-to-business basis. Our team, composed of French and Albion students, created a mobile application designed for employers and managers to ensure employee safety on remote job sites. Through market research we have found a unique niche for our product in the U.S. lone worker protection market. Primary and secondary research was utilized to facilitate our product development as well as determine market attractiveness. Given our current progress and continued development, we are optimistic that our product will acquire a sizable share of the mobile personal emergency system (mPERS) market. U.S. companies will be able to utilize our product to ensure employee safety with confidence and assurance that employees are accounted for in a safe and efficient manner, no matter where the job takes them.

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

STEVEN DICKMANN, '16

Major: Business and Organizations
Hometown: Novi, Mich.

JULIE WOOD, '16

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

JULIEN ASSEZ

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

MICKAËL BADIBANGA

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

ZAKARIA BENRAHAL

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

MATTHIEU DEL RIO

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

Through the process of international collaboration between American and French students, we have created a business plan for a technological product that motivates users to maintain and improve their physique. Our product, Silhouette, is a life-size body scanner sold directly to full-service fitness centers. The idea behind the scanner is to track physical progress of an individual's body, increasing his or her awareness of the appropriate fitness techniques targeting specific areas of the body. Through the processes of in-classroom cooperation, and out-of-classroom research and interviews, we have established the fundamentals to create a product based on the need and the desire to develop physical well-being.



About the Symposium

Albion College's Student Research Symposium is now in its 26th 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 approximately 100 students recommended by their faculty mentors. Representing a broad array of disciplines, the symposium has become the College's principal showcase for outstanding student research, scholarship, and creative activity.

The Elkin R. Isaac Endowment

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

Proceeds from the endowment have been used to 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)

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)

The 2015 Isaac Student Research Symposium Committee

Craig Bieler (Chemistry)
Sarah Briggs (Marketing/Communications Office)
Allison Harnish (Anthropology/Sociology)
E. Dale Kennedy (Biology/Brown Honors Program)
Lisa Lewis (Chemistry)
Beth Lincoln (Geology/Academic Affairs)
Ian MacInnes (English/FURSCA)
Anne McCauley (Art and Art History)
John Perney (Marketing/Communications Office)
Michael Van Houten (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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