



*Elkin R.*

**ISAAC**

**ALBION COLLEGE**

EST 1990

**STUDENT RESEARCH SYMPOSIUM**

Thursday, April 21, 2022





**9-10:15am | Student Research Platform Presentations**

Forum #1 Norris 100

Forum #2 Norris 101

Forum #3 Norris 102

**10:45am | Honors Convocation**

Goodrich Chapel

**1:15-4pm | Student Research Platform Presentations**

See locations above

**4-5pm | Student Research Poster Session**

Science Complex Atrium

**MORNING SESSION****FORUM #1 – NORRIS 100**

9:00	Noah Keck (Ash, Reimann, Riedel)	A Computational Investigation of Three-dimensional Sudoku Puzzles
9:15	Nathaniel Jennings, Daniel McGarry (Voss)	Thrust Vector Controlled Model Rockets
9:30	Lauren Bergeron (Marshall)	Using Geologic Records to Reconstruct Ancient Environments: Sedimentology of the Late Cretaceous of the Morondava Basin, Madagascar
9:45	Moses Jatta (Guenin-Lelle, Marshall)	Comparison of the Cretaceous Stratigraphy of the Morondava Basin, Western Madagascar Using Historical Versus Recent Field Records
10:00	Adam Walker (Menold)	Omphacite Chemistry of Eclogites from Tso Morari, India

**FORUM #2 – NORRIS 101**

9:00	Aminaa Injinash (Kim)	Impact of the ATM (Automated Teller Machine) Network on Small Businesses in a Cashless Economy
9:15	Grace Hoffman (Ash, Brade, Mason)	Auto Insurance Premiums For Autonomous Vehicles
9:30	Jackie Best, Elizabeth Cavataio, Reece Morey, Katie Valade, Eva Boitiveau, Hugo Bourguine, Marina Geron, Leo Groussain, Laura Héruillard, Thomas Jaeger (Baker)	B2B Idea: Leadership Elevation
9:45	Tanykia Davis, Eleanor Debo, Justin Huttenlocher, Delia Johnson, Thomas Blanquatr, Charlotte Bourhis, Luis Caridade, Anne-Benedicte Damour, Antoine Derval, Andrew Oranski, (Baker)	Think Local, LLC
10:00	Andrew Jonna, Ashley Ketchum, Emily Merucci, Claire Nickerson, Loris Bacca, Audrey Comandini, Martin Ferre, Mattieu Lalout, Valentin Perdriger, (Baker)	What's the Job: A Digital Employment App

**FORUM #3 – NORRIS 102**

9:00	Alivia Benedict (Myers)	Rap as Resistance: German Protest Hip-Hop Music
9:15	Sam VanderVeen (Ho)	Cold War, Communism, and Christianity
9:30	Emily Abramczyk (Ho)	Growth of Political Relations Between the U.S. and China Through Sports
9:45	Frank Hernandez (Noble)	The Northern Triangle Immigration towards the United States
10:00	Emily Gerlach (Yoshii)	Climate Change and Armed Conflict: Imminent Challenges in the Global South

## AFTERNOON SESSION

### FORUM #1 – NORRIS 100

1:15	Elizabeth Stout (Webb)	Benefits of Telehealth in the Management of Children with Chronic Medical Conditions
1:30	Katherine O'Connor (Franzen)	Epidemic Social Policy: How Failures of Leadership Created the HIV/AIDS and COVID-19 Crises
1:45	Jessica Garcia-Lopez (Cahill)	Macroinvertebrates as Environmental Bioindicators in South Central Michigan and Urban West Coast
2:00	Bryce Vandenburg (Cervantes)	Identifying a Transcription Factor and Promoter for the Mating Type Genes of <i>Tetrahymena thermophila</i>
2:15	Jeremy Hogaboom (Rohlman)	A Study of RNA Polymerase-Template Interaction Utilizing CRISPR/dCas9 Protein
2:30	Peter Filbrandt, Kaitlyn Piontkowsky (Rohlman, Streu)	Development of Antibacterial Type III Secretion System Binding Antibodies
2:45	Irene Corona-Avila (Streu)	Isolation and Characterization of Antimicrobials from Icelandic Aquatic Bacteria
3:00	Anna Crysler (Rohlman, Streu)	Directed Evolution of Antibacterial Nanobodies Using Novel Antigen Production Strategies
3:15	Alexis Moss (Streu)	Synthesis of Hemithioindigo Compounds as Microtubule Inhibitors
3:30	Chase Potter (Streu)	Synthesis and Analysis of a Light-Activated Chemotherapeutic
3:45	Samantha Dye (Streu)	Progress toward the Synthesis of Known Smoothened Inhibitor Azologues: Light-responsive Chemotherapies

### FORUM #2 – NORRIS 101

1:15	Akaiia Ridley (Palmer)	The Beginning of Belonging: Exploring the Black History of Albion College
1:30	Sam Semerau (Quesenberry)	The Opinion Section at War: An Exploration of the Pleiad's Opinion Section During Wartime
1:45	Caitlin Cummings (Christensen, Walling)	Promoting Purple and Gold on Tour: Developing Diversity, Equity, Inclusion and Belonging Modules for the Admissions Department
2:00	Tanya Jagdish (Wilch)	Albion College's Carbon Footprint and Climate Action at Small Liberal Arts Colleges
2:15	Niyati Kellenberg Callewaert (Walling)	Rights-Based Policing Policy in Albion, Michigan
2:30	Samantha Brand, Tori Conklin (Visco)	Michigan Central Registry Reform
2:45	Alexandria C. Eberly (Demerdash, Merriman, Solomon)	The Sculptural Book: Form, Touch, and Sentimentality
3:00	Chantz Marchetti (Balke, Henderson, Mesa)	The British Blondes: An American Burlesque

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**FORUM #2 CONTINUED**

3:15	Ian Lee (Balke, Jechura, Jensen-Abbott)	Clouds: A Dissection of the Music of Zachary David Sobiech
3:30	Nathaniel Jennings (Abbott, Kim)	Ludwig van Beethoven, Piano Concerto No. 3 in C minor, Op. 37
3:45	Allie Garland (Kim, Salazar)	Fantaisie Sur un Thème Original by Jules Demersseman)

**FORUM #3 – NORRIS 102**

1:15	Ruark Wicka (Riedel)	The Relationship between Temple and Torah in the Late Second Temple Period
1:30	Lance Glenn (Chase)	Parks and Paradise: Medieval Ireland's Anglo-Norman Deer Parks
1:45	E. Amber Blackmon (MacInnes)	Royal Mews and Carriage Horses: the Care, Use, and Maintenance of Falconry and Equines of Early Modern London
2:00	Madeline Prall (Harnish)	Inclusion of Native Voices in National Parks
2:15	Meghan Krawczyk (Francis)	Empathy, Civic Engagement, and Political Polarization in College Students
2:30	Olivia Lorenzoni (Francis, Wieth)	Math Anxiety, Gender, and Problem Solving
2:45	Viktoria M. Carr (Brown, Francis, Webb, Wieth)	Behaviors, and Feelings of Autonomy, Competence, and College Students' Opinions about Parents, Parenting Relatedness
3:00	Halley Guptil (Christopher, Madhavan-Brown)	The Effect of Crisis Negotiations on Trust in Police
3:15	Samantha Brand (Christopher)	Effect of Gender and Advertisement Type on Voting Intentions and Trait Perception
3:30	Jonathan Stander (Elschberger)	The Link between Gender-Based Object Perception and Beliefs about Gender as a Social Category in Bilingual Spanish and English Speakers

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

Zacary Besant, E. Amber Blackmon, Lyv Martinez, Jesus Rodriguez-Salas, Breh Ruger, Dana Shepard, Sarah Stovall, Samantha Swingewood, Marshall Wood (Cahill)	Identifying Suitable Habitat Patches for Monarch Butterflies and Milkweed on Albion's Campus
Zacary Besant, E. Amber Blackmon, Lyv Martinez, Jesus Rodriguez-Salas, Breh Ruger, Dana Shepard, Sarah Stovall, Samantha Swingewood, Marshall Wood (Cahill)	Waiter, What's in This Sushi? Using DNA Barcoding to Identify Fish Species in Albion's Restaurants
Ryan Beyers, Jade Patel (Streu)	Progress Toward Expression and Purification of Moonlighting Proteins for Directed Evolution of Novel Therapeutics Using GAPDH in <i>S. aureus</i>

**POSTER SESSION CONTINUED**

E. Amber Blackmon (Lee-Cullin)	Kalamazoo River Watershed Nutrient Cycle
Mariah Brenz, Madeline Budd, Teddy Hirschfield (Streu)	Progress Towards Synthesis of Azo Ponatinib
Irene Corona-Avila, Rayna Edwards, Fadwa Kamari (Streu)	Directed Evolution of a Nanobody to Bind Nipah Virus G-Protein
Amanda Duncan (Mesa)	Creative Repetition in Poetry
Hattie Folsom (Cahill)	Farmer Survey Examining Fertilizer Use and Knowledge of HABs
Courtney Fuller, Jesus Rodriguez-Salas (Gyorkos)	Investigating Self-Regulated Strategies for Pre-Class Learning in an Undergraduate Flipped Anatomy Classroom
Hannah Geiss, Haley McQuown (Harris)	Reaction of Meso-Epoxides with Lithium Amides in the Presence of a Chiral Aminoborane Catalyst Faculty
Olivia Grantham (Mesa)	Pandemic Poetry: Studying Poets' Responses to AIDS and COVID-19
Hayley Jonkman (Marshall)	Assessing Paleoenvironments of the late Jurassic Ilona River Deposits, Morondava Basin, Western Madagascar
Saige Jost (Lee-Cullin)	Evaluating the Storm Export of Dissolved Organic Carbon from an Urban Environment to the Kalamazoo River, Albion, Michigan
Diana Kernen, Noah Rollison (Streu)	Synthesis of UV-Light Sensitive Nilotinib
Brian Lomeli-Garcia (Cahill)	Regional Genetic Diversity of Aphid "Superclone"
Alyvia Martinez, Miles Newman (Cahill)	Monitoring Invertebrate Biodiversity Inside and Outside of Rice Beds
Paige McDowell (Menold)	Boron Chemistry of Phengite from the Ultrahigh-Pressure Tso Morari Terrane, India
Enisa Muhaxhiri (Appiagyei)	Decarboxylation of Amino Acids using Ruthenium of Activated Carbon Cloth (Ru/ACC)
Austin Raymond (Saville)	Investigating DNA Repair Following Excision of the Hobo Transposable Element In <i>Drosophila melanogaster</i>
Edison Symons (Appiagyei)	IDecarboxylation of Amino Acids via Electrochemical Oxidation
Esmeralda Treviño (Madhavan-Brown, Keyes)	What Empirical Research Tells Us About the Benefits of Experiential Learning
Ashlyn Wetzel (Betz, Cousins, Webb)	Assessment of Nutritional Knowledge in Division III Athletes
Samantha Zink (Lee-Cullin)	Assessing Biodegradation of Urban-derived Dissolved Organic Carbon at the Stream-groundwater Interface



### Emily Abramczyk, '24

Majors: Political Science, History  
Hometown: Rochester Hills, Michigan

#### ***Growth of Political Relations Between the U.S. and China Through Sports***

Faculty Sponsor: Joseph Ho

My research investigates how the U.S.-China ping-pong matches linked American and Chinese national identities during the Cold War by elevating sports to the level of diplomacy. Using the example of the Chinese ping-pong team visiting Michigan in the 1970s, I explore the impact of these specific encounters on fostering long-term international relations such as sparking diplomatic conversations, accepting cultural differences, and developing athletic empathy between the Chinese team and American communities. Although some may argue that sports play a divisive role in international interactions due to highly competitive attitudes intensifying rivalries, my research argues that ping-pong diplomacy was beneficial to fostering positive U.S.-China relations, both politically and culturally, as the 1972 ping-pong exchange intertwined political and athletic competition in order to elevate sports to a level of diplomacy. I demonstrate that sports competitions create mutual empathy between two groups of people and ease political tensions through people-to-people interactions, which in turn leads to the greater impact of two governments establishing political relations on the basis of friendship. Therefore, ping-pong diplomacy created specifically sports-based international contacts between the U.S. and China, and in doing so, sparked diplomatic conversations about global partnerships, efforts to bridge cultural differences, and the importance of athletic empathy as a central element in U.S.-China relations that transcended traditional political negotiations. My findings draw from public archives and primary sources covering debates over U.S.-China ping-pong exchanges from the perspectives of media, academic, and governmental groups.

*Supported by: FURSCA*



### Alivia Benedict, '22

Majors: Political Science, German  
Hometown: Vermontville, Michigan

#### ***Rap as Resistance: German Protest Hip-Hop Music***

Faculty Sponsor: Perry Myers

Racism and xenophobia persist throughout the world. Germany faces this problem as well, and people of color and those with a migrant background are subjected to implicit and explicit abuses because of systemic discrimination present within the country. Hip-hop, and more specifically rap music, provide artists with the ability to respond to and address issues that impact them and society. As hip-hop's history is rooted in resistance, the genre proves an effective voice for those most impacted by social injustices. My project uses Germany as a case study to analyze its

modern hip-hop music as a form of resistance, and I examine several artists, songs, and movements that work to address the problems. Hip-hop is especially cogent in that it takes aim at taboos--things often difficult to directly address. Many artists reference the impacts of rap lyrics themselves, giving them a specific way to address racism and xenophobia. Additionally, the platform artists enjoy as a result of their music provides a way for them to engage with anti-racist and pro-immigrant work beyond their music. German rappers work to address real issues involving racism and xenophobia. Hip-hop gives marginalized people in Germany a way to practice resistance against discrimination. Some artists have even created their own organizations in order to combat discrimination. A variety of advocacy forms is vital to the success of social justice movements, and my work investigates how rap music and musicians contribute to activist impact in Germany.

*Supported by: FURSCA - Robert M. Teeter Research Fellowship Endowment*



### Lauren Bergeron, '22

Majors: Geology, History  
Hometown: Riverview, Michigan

#### ***Using Geologic Records to Reconstruct Ancient Environments: Sedimentology of the Late Cretaceous of the Morondava Basin, Madagascar***

Faculty Sponsor: Madeline Marshall

This field and petrographic study of mixed siliciclastic and chemical sedimentary units in the Late Cretaceous of the Ampolipoly area's northern Morondava Basin of western Madagascar assesses a complex nonmarine to marine succession.

The oldest units in the Ampolipoly area commence with a thick package of clay-rich mudstones, volcanic ashes, and channel sandstones. These represent largely nonmarine settings colonized by plants, preserved as compression fossils, to marginal marine environments. The overlying unit is a distinctive concretionary sandstone rich in green clay minerals that hosts dinosaur, ammonite, and other vertebrate and invertebrate fossils. Its sedimentary and paleontological features indicate that it accumulated as a sediment-starved section during a time of high sea level. Superjacent to the dinosaur-bearing strata, a succession of coarse sandstones lacking fossils is capped by a carbonate concretionary horizon rich in well-preserved microfossils. These nearshore sands reflect deposition under poorly oxygenated conditions, followed by a rise in sea level that yielded the microfossil-rich carbonates.

The youngest units exposed in the Ampolipoly area continue through clay-rich mudstones containing microfossils, algae, and small gastropods indicative of open marine conditions. Finally, there is a rapid transition to immature sandstones that potentially represent an influx of coarser sediment due to local tectonic factors, and a fall in relative sea level to a very shallow to evaporitic nearshore environment.

Overall, these units reveal a rise and subsequent fall in sea level, through the transition from continental to marine to evaporitic environments, rich in authigenic mineralization, a diverse fauna, and overprinted by multiple stages of diagenesis.

*Supported by: FURSCA - Bruce A., '53, and Peggy Kresge, '53, Endowed Science Fellows, FDC, The Paleontological Society*



*Blockmon*

**Zacary Besant, '22**

Major: Biology, Small Business Management  
Hometown: New Lathrop, Michigan

**E. Amber Blackmon, '22**

Major: Biology, English  
Hometown: Southern Illinois



*Martinez*

**Lyv Martinez, '24**

Major: Biology, Mathematics  
Hometown: Waterford, Michigan

**Jesus Rodriguez-Salas, '23**

Major: Biology  
Hometown: Dallas, Texas



*Ruger*

**Breh Ruger, '23**

Major: Biology, History  
Hometown: Battle Creek, Michigan

**Dana Shepard, '23**

Major: Biology  
Hometown: Eaton Rapids, Michigan



*Stovall*

**Sarah Stovall, '24**

Major: Biology  
Hometown: Grosse Pointe, Michigan

**Samantha Swingewood, '22**

Major: Biology  
Hometown: Carmel, Indiana



*Swingewood*

**Marshall Wood, '23**

Major: Biology, History  
Hometown: Bay City, Michigan

**Identifying Suitable Habitat Patches for Monarch Butterflies and Milkweed on Albion's Campus**

Faculty Sponsor: Abigail Cahill

Monarch butterflies are a species of concern in North America. They depend on milkweed plants to lay their eggs and as food for caterpillars, so planting milkweed is seen as one possible way to increase butterfly populations. Albion's campus has several patches of milkweed, both on the main campus and in the Whitehouse Nature Center. We found available data about the dispersal distances of

both butterflies and milkweed, then used the data to predict the most important patches of milkweed on campus for the butterflies. We make recommendations about milkweed patches to keep and locations to plant more in order to provide the best network of habitat patches for the butterflies and other insects that depend on this key resource.

**Waiter, What's in This Sushi? Using Dna Barcoding to Identify Fish Species in Albion's Restaurants**

Faculty Sponsor: Abigail Cahill

DNA-based species identification (barcoding) is a way to use molecular tools to find out what species are found in a particular area. This technique has also been used to identify cases of seafood mislabeling in different taxonomic groups and geographic areas. We used DNA barcoding technology to identify the fish in sushi purchased on campus and AKA Sushi (Jackson, MI). DNA was extracted from fish samples and we performed a polymerase chain reaction to amplify the COI gene. Successful PCRs were sent for sequencing and compared to a database of known sequences to calculate the rate of mislabeling. Our results were compared to other values of mislabeling available in the scientific literature.

*Supported by: Albion College Biology Department*



*Best*

**Jackie Best, '23**

Majors: International Studies, French  
Hometown: San Diego, California

**Elizabeth Cavataio, '22**

Majors: Business, Communications  
Hometown: Washington, Michigan



*Cavataio*

**Reece Morey, '22**

Major: Business  
Hometown: Grand Rapids, Michigan

**Katie Valade, '22**

Major: Accounting (CPA emphasis)  
Hometown: Novi, Michigan

**Eva Boitiveau, '22**

Major: Complex Selling, International Option  
Hometown: Pontoise, France

**Hugo Bourguine, '22**

Major: Complex Selling, International Option  
Hometown: Paris, France

**Marina Geron, '22**

Major: Complex Selling, International Option  
Hometown: Houilles, France

**Leo Groussain, '22**

Major: Complex Selling, International Option  
Hometown: Versailles, France

**Laura Hérellard, '22**

Major: Complex Selling, International Option  
Hometown: Tours, France

**Thomas Jaeger, '22**

Major: Complex Selling, International Option  
Hometown: Choisy-le-Roi, France

**B2B Idea: Leadership Elevation**

Faculty Sponsor: Vicki Baker

Leadership Elevation is a startup aiming to revolutionize the HR advancement process for high potential employees who are 3-5 years post hire. Current processes may not identify talent and assist employees in developing leadership skills. Our simulations are designed to immerse the employee in typical, real-life leadership situations in today's dynamic work environment. Employees will complete computer-based simulations to receive quantitative results of current leadership skills and areas for improvement. By adopting our simulation process, we will help high potential employees move forward in their careers while also benefiting HR professionals in their identification of these high potential employees. We recognize the limitations of current talent identification. Leadership Elevation can help facilitate a more efficient process for both employee and employer.



Beyers

**Ryan Beyers, '23**

Major: Biology  
Hometown: Saginaw, Michigan

**Jade Patel, '23**

Major: Biology  
Hometown: Saginaw, Michigan



Patel

**Progress Toward Expression and Purification of Moonlighting Proteins for Directed Evolution of Novel Therapeutics Using GAPDH in *S. aureus***

Faculty Sponsor: Craig Streu

Antibiotic resistance is a significant threat to human health in all parts of the world.

New resistance mechanisms are emerging and spreading globally, threatening our ability to treat common infectious diseases and necessitating new strategies for developing antimicrobial compounds. Moonlighting proteins are a key contributor to bacterial virulence. These proteins are multifunctional proteins in which a single protein performs multiple independent functions in different cell compartments, often making use of different conformations to do so. Moonlighting proteins that act as virulence factors tend to play key roles in conserved metabolic processes and elicit relatively muted responses from the immune system. Their evolutionary conservation, evasion of immune response, and critical role in pathogenesis suggest that moonlighting proteins may make excellent targets for therapeutic development. One way to target these moonlighting proteins is with nanobodies. Nanobodies are single-domain fragments generated from camelid

antibodies that combine the beneficial properties of small molecules and monoclonal antibodies, thus making them an appealing agent for creating new antibiotics. Nanobodies are easier to produce cheaply in bulk than antibodies while maintaining excellent thermal and pH stability. Just as importantly, nanobodies may be developed using a combination of surface display and directed evolution methods allowing for expedited drug discovery in response to the development of resistance. This poster outlines progress toward the expression and purification of moonlighting proteins from *S. aureus* for use in the directed evolution of next-generation antibiotics.

Supported by: FDC

**E. Amber Blackmon, '22**

Majors: Biology, English  
Hometown: Alton, Illinois

**Kalamazoo River Watershed Nutrient Cycle**

Faculty Sponsor: Joe Lee-Cullin

Rivers and rice beds are sources of cultural importance and biodiversity. The Kalamazoo River and its rice beds are no exception to this. We also know that waterways and their vegetation are impacted by nutrients, especially from storm drains and agricultural runoff. However, we do not know exactly how the nutrients move through the rice beds. We also do not know how those nutrients interact with the rice beds, since those nutrients could potentially support or inhibit rice bed growth and development. By taking water samples surrounding and within the rice beds, this project attempts to analyze nutrients, along with their fluctuations and cycling, to better understand the interaction between those nutrients and the rice beds in the Kalamazoo River.

Supported by: FURSCA - Harriet E. Elgin, '36, Endowed Fellowship

**Royal Mews and Carriage Horses: the Care, Use, and Maintenance of Falconry and Equines of Early Modern London**

Faculty Sponsor: Ian MacInnes

Early Modern London was a significant locus of change in technology, government, science, and religion. Because of this, as a collaborative project, the Map of Early Modern London is an open-code, open-source, online peer-review project that explores late 15th-century to late-17th century London using an interactive map of London. The Royal Mews, found within Westminster, exemplifies London's transition into an urban hub and is a metonymy for royal authority. While the Mews has changed uses over time, analyzing the management, use, and presence of falconry and equines within the Mews not only provides a better understanding of Early Modern royalty, but also a better understanding of the complexities of Early Modern London.

### Samantha Brand, '22

Majors: Psychology, Political Science  
Hometown: Sault Ste. Marie, Michigan

#### ***Effect of Gender and Advertisement Type on Voting Intentions and Trait Perception***

Faculty Sponsor: Andrew Christopher

Political candidate gender is a topic of growing societal and research interest, as governmental seats are far from representative of the gender composition of American society (Current Numbers, 2021). Furthermore, the type of advertisement used in a political campaign has been suggested to be successful depending on the gender of those sponsoring the advertisements (Krupnikov, 2014). This study examined the effects of candidate gender and advertisement type on likelihood of voting for a candidate and the perception of candidate traits. Participants were recruited using an online survey site and saw one of eight fictitious advertisements in a 2x2x2 factorial experiment with the independent variables being candidate gender, gender of an advertisement sponsor, and type of negative campaign advertisement. All participants then completed a survey about perceived traits adapted from the Big-Five Traits scale (Weisberg, 2011) and a measure of likelihood to vote for the candidate in the advertisement. Results suggested that female candidates being attacked were viewed as more assertive, compassionate, extroverted, intellectual, and better at dealing with voters than their male counterparts. It was also found that when a male sponsored an attack against another male using a personal attack, they were seen as more assertive compared to a female using a personal attack. However, if a female attacked a male in a policy-based advertisement then the female was seen as more assertive, compared to a male using a policy-based advertisement. These results can be used to strategize campaign tactics based on candidate gender in the future.

*Supported by: FURSCA - Bethune Fellows Student Research Endowment*



Conklin

### Samantha Brand, '22

Majors: Psychology, Political Science  
(concentration in Public Service)  
Hometown: Sault Ste. Marie, Michigan

### Tori Conklin, '22

Major: Sociology (concentration in Public Service)  
Hometown: Chesterfield, Michigan

#### ***Michigan Central Registry Reform***

Faculty Sponsor: Edward Visco

Michigan's Central Registry is a list of people who have committed child abuse or neglect. This list is overseen by the Michigan Department of Health and Human Services and is only accessible by certain entities (CPS, police, schools, courts), but it can have lasting effects. However, not everyone who is put on the list is placed on the registry

fairly. When someone is placed on the Central Registry unfairly, it can negatively impact the children's and the parents' lives. Due to this, we helped craft legislation addressing how one gets on and possibly leaves the registry.

*Supported by: FURSCA - Bethune Fellows Student Research Endowment*



Brenz

### Mariah Brenz, '24

Majors: Biology, Biochemistry  
Hometown: Grand Blanc, Michigan

### Madeline Budd, '24

Major: Biochemistry  
Hometown: Howell, Michigan



Budd

### Teddy Hirschfield, '24

Major: Biochemistry  
Hometown: Lake Orion, Michigan

#### ***Progress Towards Synthesis of Azo Ponatinib***

Faculty Sponsor: Craig Streu



Hirschfield

There are currently around one hundred drugs that treat cancer and many times that number in the early stages of development. The function of these chemotherapy drugs is to attack cancer cells. The drawback of these drugs is that they also frequently strike against the normal cells in the body. Ponatinib is a drug

that treats chronic myeloid leukemia and acute lymphocytic leukemia. These types of cancers affect the blood and bone marrow. The structure of ponatinib includes a bond in the middle of the molecule that can be replaced with a different type of bond. This new bond allows the molecule to change shape when irradiated with UV light. With careful design, it is possible to exploit this shape change in such a way that the drug is activated in response to very specific types of light. The chief advantage of such therapies is that they can therefore be activated selectively only in the afflicted tissue. We are therefore working toward synthesizing a photoswitchable version of ponatinib with the goal of eliminating the malicious crusade on noncancerous cells.



### Niyati Kellenberg Callewaert, '22

Major: Public Policy  
Hometown: Ann Arbor, Michigan

#### ***Rights-Based Policing Policy in Albion, Michigan***

Faculty Sponsor: Carrie Booth Walling

In Michigan there are curriculum gaps between Michigan's Basic Training Curriculum, Training Objectives and the international base standards. This study focuses on Albion, Michigan's police training curriculum and advocates for additional training in crisis intervention, de-

escalation, cultural competency and both systemic and implicit bias training as well as additional engagement with the community. The research methods used during this study were independent research with primary and secondary sources with a deep analysis using the Universal Declaration of Human Rights, the United Nations Training Standard and the Amnesty International document “Guidelines for Implementation of the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials.” I also had structured interviews with key stakeholders as well as community engagement with the Albion branch of the NAACP and local law enforcement. My policy memo includes recommendations that range from inexpensive proposals such as weekly reflections to ones that require more funding, such as paid partnerships to help provide further training. To conclude: this project’s objective is to increase the education and policy advocacy around police training and curriculum discrepancies in Albion, Michigan.



**Viktoria M. Carr, '22**

Major: Psychological Science  
Hometown: Bay City, Michigan

***College Students’ Opinions about Parents, Parenting Behaviors, and Feelings of Autonomy, Competence, and Relatedness***

Faculty Sponsors: Andrea P. Francis, Mareike B. Wieth, Shanti M. Brown, Meghan F. Webb

Parenting behaviors may impact offspring’s ability to become more autonomous, competent, and relate to new people (Deci & Ryan, 2000). Baumrind (1989; 1991) suggests parenting can be broken down into responsive and demanding behaviors. Both authoritarian parenting (demanding, but not responsive) and permissive parenting (not demanding, but very responsive), tend to be more associated with children who are more anxious and depressed than children with authoritative parents (both demanding and responsive) (Wolfradt et al., 2003). Helicopter parenting involves protecting offspring from adversity, failure, and pain (Gibbs, 2009) and is associated with a mix of both favorable (e.g., high academic achievement) and unfavorable outcomes (e.g., increased anxiety and depression) (Darlow et al., 2017; LeMoyné & Buchanan, 2011). Additionally, both gender and perception of helicopter parenting behaviors are associated with feelings of autonomy and college students’ fear of being negatively evaluated (Carr et al., 2021). The purpose of the current study is to examine the relationship between parenting behaviors, the college students’ opinions of their parents’ behaviors, and the students’ feelings of autonomy, competence, and relatedness.

To test this relationship, a total of 155 college students completed surveys about their parental opinions, types of parental behaviors they experienced (Alkharusi et al., 2011; LeMoyné & Buchanan, 2011), and basic needs satisfaction (Finney & Johnston, 2010). Results suggest that, even after taking into account differences in reported parenting behaviors, more favorable opinions of parents

were associated with increased feelings of autonomy, competence, and relatedness in college-aged offspring.

*Supported by: FURSCA - Bethune Fellows Student Research Endowment*



Avila

**Irene Corona Avila, '22**

Major: Biochemistry  
Hometown: Lawrenceville, GA

**Rayna Edwards, '23**

Major: Biology  
Hometown: Manchester, Michigan

**Fadwa Kamari, '23**

Major: Biochemistry  
Hometown: Grand Rapids, Michigan

***Directed Evolution of a Nanobody to Bind Nipah Virus G-Protein***

Faculty Sponsor: Craig Streu

The Nipah virus is a highly pathogenic contagious virus that is easily transmitted between animals and humans. With no treatment and a high mortality rate, it’s ranked by the World Health Organization as one of the ten diseases posing the greatest epidemic risk. The G protein of Nipah virus is a large, glycosylated protein that contains a substantial extracellular segment that allows the virus to identify host cells and initiate the cellular entry process. Molecules that interfere with this interaction have been used to great effect to blunt or prevent infections in numerous viruses, such as SARS-CoV2. One such molecule is the nanobody, which is the minimal binding unit of camelid antibodies. Nanobodies are particularly attractive for this type of application because they have favorable drug-like properties and can be developed incredibly efficiently using directed evolution techniques. Directed evolution makes use of any one of several selection strategies to identify molecules with the desired characteristics from a diverse pool of molecules, which can be created using straightforward genetic manipulations. This presentation outlines progress toward the cloning, amplification, and isolation of a G protein derivative for use in the selection of potential nanobody-based Nipah virus therapeutics.

*Supported by: FURSCA, FDC*



**Irene Corona-Avila, '22**

Major: Biochemistry  
Hometown: Lawrenceville, Georgia

***Isolation and Characterization of Antimicrobials from Icelandic Aquatic Bacteria***

Faculty Sponsor: Craig Streu

Despite advances in the methods for natural product (NP) discovery, the discovery of new antibiotics is outpaced by antibiotic resistance. By 2050, 10 million people are

expected to die from drug-resistant bacterial infections per year. A major hurdle for antibiotic discovery lies in the inability of commonly used methods to a) allow for high throughput screening of bacteria, and b) reduce chemical redundancy in microbial libraries. In the Murphy lab, we aim to reduce redundancy and accelerate efficiency and effectiveness through an innovative NP drug discovery process using IDBac, a program assisting to reduce taxonomic and chemical redundancy. In this study, we worked with previously collected Icelandic bacterial isolates K391, K765, and K802. We performed liquid chromatographic separations of the isolate extracts and investigated the isolates' ability to produce antibacterial molecules through growth inhibition assays. Bacterial isolate K391 displayed weak antibacterial activity in fractions 3-5, 14-15, and 25-26. We are further investigating the K391 fractions through MS/MS and GNPS analysis to identify any known antibacterials in the fractions.

*Supported by: UIC College of Pharmacy Student Undergraduate Research Fellowship (SURF), Brian Murphy Lab*



### **Anna Cryslar, '22**

Major: Biochemistry  
Hometown: Rockford, Michigan

#### ***Directed Evolution of Antibacterial Nanobodies Using Novel Antigen Production Strategies***

Faculty Sponsors: Craig Streu, Christopher Rohiman

Misuse and overuse of antibiotics since the 1940s have caused a rise in antibiotic-resistant infections, and over the past few decades antibiotic discovery and development have slowed. As a result, we are facing a crisis that is expected to create up to 10 million deaths globally by 2050 without urgent action. Selective pressure from antibiotics allows bacteria to evolve resistance mechanisms, creating infections that can become severe and difficult or even impossible to treat. Many antibiotics deemed 'last resort' are diminishing in effectiveness due to the emergence of highly resistant bacteria strains. Among these antibiotics of last resort are the glycopeptide antibiotics, which target lipid II, the key precursor to bacterial cell wall synthesis in Gram-positive bacteria. Glycopeptide resistant bacteria evade these drugs by modifying lipid II to prevent glycopeptide binding, rendering the drugs ineffectual. As bacterial resistance spreads, new antibiotics must be created to target these resistant strains. One strategy is to target the modified lipid II molecules. Still, the rate at which bacteria can overcome new drugs necessitates new antibiotic discovery approaches that both accelerate development and reduce the cost of discovery. My research focuses on developing a novel strategy for antibiotic drug discovery using directed evolution techniques. By taking advantage of selective processes, much like those driving the development of resistance itself, directed evolution may make it possible to generate novel antibiotics faster than resistance mechanisms can spread widely. This

presentation outlines my work on the directed evolution of nanobodies, which are single domain antibodies with favorable drug-like properties, for use as antibiotics against lipid II. The process leverages a unique antigen production and selection strategy that is expected to be broadly applicable to a wide range of Gram-positive pathogens.

*Supported by: FURSCA - Bruce A., '53, and Peggy Kresge, '53, Endowed Science Fellow, ASBMB Summer Research Grant, FDC*

### **Caitlin Cummings, '22**



Major: Political Science  
Hometown: Gurnee, Illinois

#### ***Promoting Purple and Gold on Tour: Developing Diversity, Equity, Inclusion and Belonging Modules for the Admissions Department***

Faculty Sponsors: Carrie Walling, Nels Christensen

Albion College's commitment to becoming an anti-racist institution has prompted the need for reflection among the many departments on campus. One such place is the Admissions Department, where tour guides give campus tours to prospective students and their supporters. This project seeks to design a robust curriculum for educating tour guides and to illustrate the process of development and implementation. The curriculum includes four training modules covering the importance of belonging, the history of Albion, the basics of diversity, equity, inclusion, and belonging, and strategies for increasing belonging in the workplace. Creating change requires not only collaboration from stakeholders but also an informed perspective on the values and goals of the department. Therefore, implementing an effective diversity, equity, inclusion, and belonging curriculum in the Admissions Department requires an understanding of the community, developed templates for facilitators to use, and buy-in from administration.

*Supported by: FURSCA, Human Rights Lab, Admissions Department*



*Davis*

### **Tanykia Davis, '24**

Major: Physics  
Hometown: Detroit, Michigan

### **Eleanor Debo, '22**

Major: Business  
Hometown: Bay City, Michigan



*Huttenlocher*

### **Justin Huttenlocher, '23**

Major: Finance  
Hometown: Shelby Township, Michigan

### **Delia Johnson, '24**

Major: Finance  
Hometown: Grand Rapids, Michigan



Johnson

**Thomas Blanquatr, '22**

Major: MIA2  
Hometown: Saint-Germain-en-Laye, France

**Charlotte Bourhis, '22**

Major: MIA2  
Hometown: Conflans-Sainte-Honorine, France

**Luis Caridade, '22**

Major: MIA2  
Hometown: Paris, France

**Anne-Benedicte Damour, '22**

Major: MIA2  
Hometown: Île de la Réunion (Saint Denis), France

**Antoine Derval, '22**

Major: MIA2  
Hometown: Saint-Germain-en-Laye, France

**Andrew Oranski, '22**

Major: MIA2  
Hometown: Donetsk, Ukraine

**Think Local, LLC**

Faculty Sponsor: Vicki Baker

Think Local is a startup program looking to increase and bring attention to small businesses in local cities by offering marketing techniques, loyalty programs, and consumer traffic. Our program is for businesses and customers, both residential and visiting. Our product is designed to bring attention to the small business industry and to promote success in the local community through increased customer traffic and loyalty. The goal is to help small businesses compete with larger corporations.

**Amanda Duncan '23**

Majors: English, French  
Hometown: Chicago, Illinois

**Creative Repetition in Poetry**

Faculty Sponsor: Helena Mesa

Repetition is seen in many aspects of life. In poetry, this is no different. A goal in this project was to better understand how different forms use repetition. One such form studied was the pantoum. Pantoums have been around for a long time and have changed ever since the form was adapted from Malaysia by the French. In this form, you have four lines grouped together at a time, forming a stanza. Two lines in each stanza repeat in the following stanza, forming a connected chain or loop. The next step after learning about the form's history and structure was to read other poems written in this form. This allowed for a better understanding of the form through a practical application, and it made writing in the same form much easier. Writing, critiquing, and revising in the new form was the end goal of this project. By repeating this process, the idea was to improve

skills in poetry writing and to be able to use repetition in a way that allows for enhanced meaning in a given work. It is through processes like these that one becomes a more skilled writer.

Supported by: FURSCA

**Samantha Dye, '23**

Major: Biochemistry  
Hometown: Canton, Michigan

**Progress toward the Synthesis of Known Smoothened Inhibitor Azologues: Light-responsive Chemotherapies**

Faculty Sponsor: Craig Streu

My research is focused on synthesizing light-responsive versions of two known smoothened inhibitors, vismodegib and sonidegib. Smoothened is a transmembrane protein that is a key component of the Hedgehog signaling pathway. This pathway is very important for tissue proliferation, but when mutations arise, it leads to cancerous cell formation. The goal of my project is to create photo-activatable azologues of these smoothened inhibitors that can be selectively activated in diseased tissue. This has the potential to drastically reduce the harsh side effects of chemotherapy drugs, which can often be attributed to their toxicity in healthy cells. To accomplish this, the drugs are designed to be taken in their inactive form and activated by photoisomerization in response to light administered selectively to the cancer cells, leaving healthy cells unharmed. In this presentation I will share the progress I have made and the challenges I have encountered in the synthesis of the desired compounds.

Supported by: FURSCA - Orpha Leiter Irwin Fellowship, FDC

**Alexandria C. Eberly, '22**

Majors: Art, Art History  
Hometown: Cincinnati, Ohio

**The Sculptural Book: Form, Touch, and Sentimentality**

Faculty Sponsors: Emmeline Solomon, Shauna Merriman, Nancy Demerdash

The book as an object lies at the crossroads between artistic production and academic utilitarianism. This thesis is an exploration of my cumulative artistic portfolio of sculptural books, in which I examine the place of the artist book within both contemporary and historic artistic canons. I explore the ways in which books exist as both utilitarian tools and sculptural forms and the role that audience participation plays in the interpretation of artistic works. I ask viewers of my work to consider how my pieces relate to concepts of memory accumulation, posterity, and the intimate rituals associated with the touching of objects. I prompt one to consider the book as not only a receptacle of textual information, but as a vessel that records touch,

sentimentality, and history. I seek to create sculptural objects that are inherently dependent upon viewer interaction to unveil hidden meaning within the pieces.

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



Filbrandt

**Peter Filbrandt, '23**

Majors: Biochemistry, Spanish  
Hometown: South Haven, Michigan

**Kaitlyn Piontkowsky, '23**

Majors: Biochemistry, Spanish  
Hometown: Grand Rapids, Michigan

***Development of Antibacterial Type III Secretion System Binding Antibodies***

Faculty Sponsors: Craig Streu, Christopher Rohlman

Common staple crops such as wild rice and tomatoes are susceptible to infection by the bacterial pathogens *Xanthomonas oryzae* pv. *oryzae* and *Pseudomonas syringae* pv. *syringae* respectively. These pathogens are just two among many pathogens that use a protein structure called the type three secretion system (T3SS), which resembles a microscopic protein-based hypodermic needle, to infect their host cells. Species with T3SSs translate and assemble the subunits of the T3SS in a precise order to form the large complex that inserts effector proteins into the host cell's cytoplasm. Once inside the host, these effector proteins begin a series of events that lead to full bacterial invasion of the host cell, which can result in its death. Due to global dependence on these food sources, the repercussions from the spread of these infections is potentially devastating. To address this potential crisis, we are pursuing the development of biological antibiotics that will bind to a crucial subunit in each pathogen's T3SS, impeding proper assembly and function, and rendering the bacteria non-pathogenic. This presentation illustrates the selection, cloning, and purification of a T3SS antigen for directed evolution of nanobodies as T3SS-targeting antimicrobials.

*Supported by: FURSCA, FDC*



**Hattie Folsom, 22**

Majors: Biology, Religious studies  
Hometown: Harbert, Michigan

***Farmer Survey Examining Fertilizer Use and Knowledge of HABs***

Faculty Sponsor: Abigail Cahill

Harmful algal bloom is a broad term that encompasses many species of algae that are a threat to both marine and freshwater environments when their population numbers become too large. Although there is a need for additional research on these freshwater events, anthropogenic eutrophication has increased the frequency and intensity of these blooms. One such source of concern is nutrient runoff

and excessive fertilizer use within farming communities. The goal of this study was to evaluate farmer practices in an attempt to raise awareness of excessive fertilizer use and its dangers associated with freshwater HABs. In order to better understand farming practices and how they may relate to HABs, we designed a survey that was sent to farmers examining the current knowledge and practices within farming communities as well as the prevalence of HAB-related events. The survey was primarily distributed via IDEA Farm Network Google group as well as some other farming connections. We utilized the snowball sampling technique by asking participants to pass on the survey to other farmers, but by the end of the collection period, there were only 17 completed responses to the survey. Despite this, the results of the survey reveal a potential need for more education within the farming community. Analysis of the data shows the majority of farmers may underestimate the dangers HABs pose to terrestrial ecosystems and few recognize the effects HABs have on farming practices directly. Data also suggests that there is a need for more awareness and monitoring of HAB events.



Fuller

**Courtney Fuller, '25**

Major: Kinesiology  
Hometown: Marshall, Michigan

**Jesus Rodriguez-Salas, '23**

Major: Biology  
Hometown: Dallas, Texas

***Investigating Self-Regulated Strategies for Pre-Class Learning in an Undergraduate Flipped Anatomy Classroom***

Faculty Sponsor: Amy Gyorkos

The flipped classroom model has become increasingly popular in science education in order to increase active learning during class time. In order for students to be prepared for active and higher-order thinking and application during class, they must engage in autonomous self-directed learning outside of and in preparation for class. Although the flipped model assumes students have the inherent ability and motivation to engage in this pre-class self-regulated work, researchers have shown undergraduate students are vastly under-prepared. Therefore, the purpose of this study is to assess student's readiness for a flipped classroom based on their perceived attitudes, motivations, perceptions, pre-class learning strategies, and course performance. In order to assess these factors, all students from KIN 230, Human Systems Anatomy, will be exposed to a flipped classroom model in Spring 2022 and be eligible to participate in the study. This study will adopt a mixed method research design, as elements of qualitative and quantitative research approaches will be used to more broadly and deeply understand the effects of flipped classrooms on perceived attitudes and learning strategies and outcomes. The quantitative data will be derived from performance markers (exams, mid-term and final grades, and participation) and survey tools (reflection survey and self-regulated learning instrument). The qualitative data will be derived from open-ended responses found in both

survey tools. This study will explore 1) students' self-regulated learning strategies; 2) students' attitudes and perceived level of interest, motivation and engagement; and 3) the relationships between these factors and course performance in an undergraduate flipped classroom.



**Jessica Garcia-Lopez, '22**

Majors: Biology, Environmental Studies  
Hometown: Los Angeles, California

***Macroinvertebrates as Environmental Bioindicators in South Central Michigan and Urban West Coast***

Faculty Sponsor: Abigail Cahill

The overall research incorporates macroinvertebrates as bioindicators and explores how environmental health can be determined through the diversity and taxonomy of these species. The objective of our research was to collect macroinvertebrates from the Kalamazoo River (Michigan) to understand how macroinvertebrate communities found in wild rice (*Zizania aquatica*) change throughout the seasons. During the fall of 2020, we deployed collectors into the Kalamazoo River. The collectors were left for two weeks in the river to allow the colonization of invertebrates. The collected material was preserved in ethanol. The same process was repeated in May, 2021. This research has helped fuel the Wild Rice Project on campus, which aims at contributing to helping conserve this sacred and agricultural plant of the Anishinaabek. The second part of the research took samples from the Ballona Freshwater Wetland in California and the Kalamazoo River in Michigan. The Ballona Freshwater Wetland is an ecological reserve that has been under protection from urbanization and provides a nursery for fishes, a rest stop for birds, a local buffer, and a water filtration system. The Kalamazoo River that runs by Whitehouse Nature Center is a habitat for many invertebrates and other species. The objectives were to compare bioindicators from a rural and urban area and to determine how urbanization has affected the populations of macroinvertebrates by comparing the two distinct locations.

*Supported by: FURSCA - Kenneth Ballou, '47, Research Endowment for Biology*



**Allie Garland, '22**

Majors: Music Performance, Marketing Management  
Hometown: Bedford, Michigan

***Fantasia sur un thème original by Jules Demersseman***

Faculty Sponsors: Nathan Salazar, Ji Hyun Kim

*Fantasia sur un thème original* was originally written for saxophone and piano in 1860, by 19th-century French composer Jules Demersseman, who today remains best known for his flute and saxophone compositions. *Fantasia*

was dedicated to a Belgian saxophonist Henri Wuille, who originally began his musical career as a clarinetist. Written only about twenty years after the saxophone was invented, this composition is widely considered to be one of the earliest significant contributions to the saxophone repertoire. While not a solo concerto work, *Fantasia sur un thème original* features virtuosic and improvisation-like cadenza passages within the 'Theme and Variations' structure. The dramatic piano introduction is followed by a somber thematic melody in the saxophone. This theme is then recast in several variations, showcasing the technical and musical capabilities of this new instrument. As one of two winners of the 2022 Albion College Concerto & Aria Competition, I am honored to be nominated to present this short spoken introduction which will be followed by a recorded performance that I made of this work with piano. Tomorrow I will be performing this work in an orchestrated arrangement with the Symphonic Wind Ensemble (directed by Professor John Johnston) here on campus in Goodrich Chapel at 7:30pm.

**Hannah Geiss, '22**

Majors: Biochemistry, Philosophy  
Hometown: Chesterton, IN

**Haley McQuown, '22**

Major: Biochemistry  
Hometown: Albion, MI

***Reaction of Meso-Epoxides with Lithium Amides in the Presence of a Chiral Aminoborane Catalyst***

Faculty Sponsor: Clifford Harris

A study of the reactions of simple meso-epoxides with several lithium amides in the presence of a chiral amine-borane has begun. The effect of variations in solvent, temperature, N-substitution, and order of addition have been investigated using the ratio of allylic to amino alcohols as a measure of mechanistic influence.

*Supported by: FURSCA*



**Emily Gerlach, '22**

Major: International Studies  
Hometown: Naperville, Illinois

***Climate Change and Armed Conflict: Imminent Challenges in the Global South***

Faculty Sponsor: Midori Yoshii

The severity and speed of climate change are rapidly increasing, and many experts agree that climate change may be a driver of armed conflict and security risk in nations all over the world. Those particularly affected are unstable nations that lack the infrastructure to adequately address climate change-induced environmental pressures such as flooding, drought, crop failures, sea level rise, and more. In the presence of other conflict risk factors, climate change acts as a "threat multiplier." My research examines

the existing studies addressing this issue and finds that more work needs to be done to reduce the possibility of armed conflicts in vulnerable countries in the Global South. The United Nations Security Council has taken some measures to bolster conflict prevention in developing countries, and global powers such as the U.S. have been discussing climate change as a national security problem since the early 2000s, but climate change-exacerbated conflicts continue to alter the lives of millions. It is now more important to adopt both climate change mitigation and adaptation policies in all countries, but especially in those most vulnerable to the outbreak of conflict. Climate mitigation is necessary to combat the broadest effects of climate change, but climate adaptation—including updated infrastructure, educated and sustainable methods of water and agricultural management, transnational collaboration, and support for displaced people—are essential for managing the immediate risks of conflict in climate-vulnerable and politically or socially unstable regions of the world.

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



**Lance Glenn, '22**

Majors: Anthropology, History  
Hometown: Seagoville, Texas

***Parks and Paradise: Medieval Ireland's Anglo-Norman Deer Parks***

Faculty Sponsor: Brad Chase

How we create meaning in our natural environment is a human experience dating back to prehistory. The creation of parks in the ancient—and modern—world symbolizes the relationships we construct with the natural world around us. Ireland's high-medieval Anglo-Norman parks represent this historic legacy. The Anglo-Norman rulers of Ireland, after their invasion in 1169 CE, brought with them their tradition of building deer parks to Ireland as they shaped the Irish landscape to fit their English identity. These deer parks created a colonized landscape and were used for hunting and resource acquisition that supported the manorial institutions associated with them. In the summer of 2021, I participated in archaeological fieldwork at Ireland's first Anglo-Norman castle, Carrick, constructed alongside Ireland's first Anglo-Norman deer park. Based on this research experience, I will present how the zooarchaeology of Carrick, and the historical use of its environment, reveals the ways in which these institutions were given meaning by the colonial agents who created them and the Anglo-Gaelic peoples who looked upon them.



**Olivia Grantham, '22**

Major: English (concentration in Creative Writing)  
Hometown: Dearborn, Michigan

***Pandemic Poetry: Studying Poets' Responses to AIDS and COVID-19***

Faculty Sponsor: Helena Mesa

Everyone responds to the pandemic differently. Like other artists, poets have responded in their own way, writing to express themselves creatively and sentimentally. During the height of the AIDS pandemic in the 1980s, poets such as Mark Doty and Thom Gunn spoke to the individuality of the disease. Now, amateur and experienced poets alike come together to discuss the universal experience of COVID-19. Past poetry informs contemporary poetry. Both genres analyze the human experience of illness and isolation. Despite their differences, the historical significance of pandemic poetry remains the same.

*Supported by: FURSCA*



**Halley Guptil, '22**

Majors: Psychology, Marketing  
Hometown: Clinton Township, Michigan

***The Effect of Crisis Negotiations on Trust in Police***

Faculty Sponsors: Shanti Madhavan-Brown, Andrew Christopher

In a police system that is often plagued with instances of aggression and discrimination, it does not come as a surprise that some people see a need for change that allows the public to regain trust in a fair and effective police force. The current experiment examined how the use of crisis negotiation tactics affected the level of trust individuals express towards police officers.

We gathered data from 53 undergraduate students (58.5% white, 41.5% people of color: 13.2% black, 22.6% Hispanic, 5.7% biracial; 32.1% men, 67.9% women; age range: 18-24 years, M = 20.06 years). The experiment began with a pre-test asking questions about trust in a variety of public institutions. Students were then given one of two fictitious articles about a barricade situation following a robbery. One article reported a more aggressive police response to the situation, whereas the other article reported a police response that utilized a crisis negotiation. After reading one article, participants answered questions to measure their trust in the specific police officer mentioned in the article.

A series of independent sample tests suggested that, as expected, people of color were generally less trusting of police than were white participants. Women were found to be less trusting than men of the police. Importantly, participants exposed to the crisis negotiation condition expressed stronger levels of trust in police than those in the aggressive police response condition. The implications of these findings and their application will be discussed.



**Frank Hernandez, '22**

Majors: Latin America and Latino Studies,  
History, Educational Studies  
Hometown: Houston, Texas

***The Northern Triangle Immigration towards  
the United States***

Faculty Sponsor: Marcie Noble

The United States and Latin America have always been connected through history, war, policies, and much more. This presentation will cover some historical aspects regarding policies that have affected U.S. immigration from Latin America, specifically Mexico and the Northern Triangle, Guatemala, El Salvador, and Honduras, and how these effects are present today. This presentation will also discuss how current issues in the Northern Triangle are pushing citizens of these countries to leave and what factors are pulling them towards the United States. Due to the nature of this research and how current it is, there is no end result or conclusion but it will help provide context and awareness of what is happening today in these countries.

*Supported by: FURSCA - Hyde Fellows in Student/  
Faculty Research*



**Grace Hoffman, 22**

Major: Mathematics with an  
Actuarial Emphasis  
Hometown: Flint, Michigan

***Auto Insurance Premiums For  
Autonomous Vehicles***

Faculty Sponsors: Darren Mason,  
Drew Ash, Laura Brade

With emerging advancements in technology to make fully autonomous vehicles, insurance writers have to adapt to changes in the pricing of auto insurance premiums. It is predicted that auto insurance premiums will decrease because autonomous vehicles are thought to reduce the number of claims (accidents). The goal of this thesis is to use Generalized Linear Models (GLMs) to predict non-autonomous vehicle premiums and then make adjustments to the model to account for a decrease in the number of claims reported. With the introduction of autonomous vehicles, the number of claims are reduced by 25%, 50%, 75%, and 90% in the model. If there are 100% autonomous vehicles in the model, then the pure premiums will decrease by about 16% to about 66% as the number of claims decrease. If there are about 50% non-autonomous and 50% autonomous vehicles in the model, the pure premiums are reduced by about 15% to about 45% as the claims are decreased. As expected, autonomous vehicles decrease the losses incurred by customers because of the reduction in accidents. Although pure premiums still decrease, they don't decrease as much when there are 50% autonomous vehicles in comparison to when there are 100% autonomous vehicles in the model.

**Jeremy Hogaboom, '22**

Major: Biochemistry  
Hometown: Highland, Michigan

***A Study of RNA Polymerase-Template Interaction Utilizing  
CRISPR/dCas9 Protein***

Faculty Sponsor: Christopher Rohlman

In vitro transcription is now a routine biochemical technique that allows for the synthesis of RNA molecules from a DNA template. This is done utilizing a variety of bacterial and phage proteins called RNA polymerases. Transcriptional pausing is a common biological phenomenon, yet the molecular mechanism of pausing is not yet well understood. Bacterial and phage RNA polymerases have been demonstrated to behave differently when they encounter a protein blockade during transcription. The goal of this project is to characterize the transcription complex as it encounters the protein blockade. Characterization of this complex will enable us to better understand the structural and chemical interactions between the polymerase, the DNA template, and the blockade protein. The protein blockade was engineered using the dCas9 protein from the CRISPR system. The CRISPR system is an adaptive immune system found in Archaea and many Bacteria that has been widely repurposed to allow for specific and flexible gene editing. By using a nuclease deficient Cas9 protein (dCas9), we can create a protein blockade that will not cleave the template. dCas9 protein binds guide RNA that is complementary to a target DNA sequence within the transcription template sequence, creating a reversible blockade at specific locations in order to study the RNA polymerase interaction. In vitro conditions for T7 RNA polymerase have been optimized, and initial characterization of the complex has been completed. This work will allow us to better understand the mechanism behind a novel, flexible, and reversible transcriptional control system.

*Supported by: FURSCA - Robson Family Fellows Endowment*



**Aminaa Injinash, '24**

Majors: Mathematics, Economics  
Hometown: Ulaanbaatar, Mongolia

***Impact of the ATM (Automated Teller  
Machine) Network on Small Businesses in  
a Cashless Economy***

Faculty Sponsor: Seolah Kim

Advances in technology have created digital forms of payments which differ from traditional ATM cash withdrawals. These digital payments include debit cards, mobile applications, QR codes, POS machines, and e-wallets. With an increasing trend in digital payment usage, small and medium businesses face the challenges of whether to adopt digital payment methods or continue accepting only cash payments. While they can increase profits by adopting digital payment methods, these methods are costly for those small business owners to implement. As small and medium-sized firms are important to the economy, we analyze the impact of

accessibility to cash on a small business owner's income. We find that the increase in the accessibility to cash increases the small business owner's income, and its impact is stronger as the firm size decreases.

*Supported by: FURSCA / Vernon and Galdys B. Lawson Endowed Research Fellowship*



**Tanya Jagdish, '22**

Majors: Biology, Math  
Hometown: Bengaluru, India

***Albion College's Carbon Footprint and Climate Action at Small Liberal Arts Colleges***

Faculty Sponsor: Thom Wilch

Climate change is a global existential crisis that affects all sectors of society and disproportionately affects marginalized communities. Higher education institutions have a responsibility to lead the fight against climate change through education and mitigation initiatives. More than six hundred North American colleges and universities, including Albion College, have pledged to become carbon neutral by signing the Presidents' Climate Commitment. However, planning and organizing toward this goal are a challenge. Through interviews with sustainability and facilities staff at eight colleges and analysis of fourteen college climate action plans, I explore systems that lead to successful climate action at U.S. liberal arts colleges. Conducting a greenhouse gas (GHG) emissions inventory is a prerequisite for all climate action plans. I have been working on-campus with Facilities Operations and Business Office staff to collect Albion College's greenhouse gas emissions data. In my research, I document the methodology for conducting a GHG inventory and provide recommendations for reducing these emissions at Albion College.

*Supported by: FURSCA / Bruce A., '53, and Peggy Kresge, '53, Endowed Science Fellows, CSE*



**Moses Jatta, '22**

Major: Geology  
Hometown: Adison, Wisconsin

***Comparison of the Cretaceous Stratigraphy of the Morondava Basin, Western Madagascar Using Historical Versus Recent Field Records***

Faculty Sponsors: Madeline Marshall, Dianne Guenin-Lelle

The Morondava Basin is the largest of three major sedimentary basins in Madagascar, and its Mesozoic Era stratigraphy remains poorly studied. The goal of this study is to compare historical records and recent field data of these sedimentary deposits to better reconstruct the paleoenvironments. First, I completed the first full translations of field reports of French geologist Henry Besairie (1972) from French to English. Using these

detailed descriptions, I drafted stratigraphic sections to correlate lithologies and fossils across the Basin. This has revealed two Cretaceous-aged basaltic flows in the North, and none in the South of the basin, likely related to rifting activity during the final isolation of the island. Both historical and recent field data document a diverse marine fauna, dominated by belemnites, brachiopods, ammonites, gastropods, and bivalves. These records indicate shallow, aerobic seas were the dominant paleoenvironments preserved as this basin filled. The Northern Morondava Basin is dominated by recent sandstones; the oldest marine deposits began in the Bajocian (mid-Jurassic), and deposition was continuous through the mid-Cretaceous. The earliest continental deposits in the North (Turonian) are capped by Turonian basaltic flows and subvolcanic intrusions. In the Southern Morondava Basin, the late Jurassic deposits are poorly exposed, potentially related to more prevalent faulting in the area. Both the North and South host Paleozoic through Cenozoic sediments; the North is distinguished by more volcanic deposits and Cretaceous-aged exposures, which have yielded exceptional titanosaurian sauropod and ammonite fossils through recent fieldwork.

*Supported by: FURSCA - Jean Bengel Laughlin, '50, and Sheldon Laughlin Endowment for Student Research, FDC, NSF*



Jennings

**Nathaniel Jennings, '22**

Majors: Physics (combined with Engineering), Music Performance  
Hometown: O'Neill, Nebraska

**Daniel McGarry, '22**

Majors: Physics (combined with Engineering), Music Performance  
Hometown: Macomb, Michigan

***Thrust Vector Controlled Model Rockets***

Faculty Sponsor: Philip Voss

Lacking any fins or other aerodynamic features, modern-day rockets are inherently aerodynamically unstable. To control stability during flight, rockets employ a concept called thrust vector control (TVC). TVC is the method by which the direction of exhaust expelled from the rocket motor is regulated so that the vehicle remains on the desired flight path. With their use of fins, model rockets that can be bought at hobby stores resemble a dart more than an actual modern rocket. The goal of our project is to create and build all the required hardware and software for a model rocket that utilizes TVC. All our designs and code will be shared on open-source websites such as GitHub and Thingiverse with the aim of helping advance the amateur model rocket community. TVC has not been widely experimented with at the amateur level, so we aspire to create the toolkit for other enthusiasts to continue building upon our research.

*Supported by: FURSCA - Bruce A., '53 and Peggy Kresge, '53 Endowed Science Fellows, Albion College Physics Department, Council for Undergraduate Research (CUR)*


**Nathaniel Jennings, '22**

Major: Physics (combined with Engineering), Music Performance  
Hometown: O'Neill, Nebraska

**Ludwig van Beethoven, Piano Concerto No. 3 in C minor, Op. 37**

Faculty Sponsors: David Abbott, Ji Hyun Kim

On February 4th, 2022, I was a participant in the Albion College Concerto and Aria Competition, which is an annual, externally adjudicated event sponsored by the college music department. As one of the two winners in this competition, I have earned the opportunity to perform the first movement of Beethoven's third piano concerto with the Albion College Symphony Orchestra, under the baton of Dr. Ji-Hyun Kim, on Sunday, April 24th, at 4:00 p.m. in Goodrich Chapel. Today I am honored to present an abridged performance of the first movement with a second piano orchestral accompaniment that was recorded earlier on the concert stage of the college music department.


**Hayley Jonkman, '23**

Major: Geology  
Hometown: Lafayette, Indiana

**Assessing Paleoenvironments of the late Jurassic Ilona River Deposits, Morondava Basin, Western Madagascar**

Faculty Sponsor: Madeline Marshall

This study assesses shell beds from Late Jurassic deposits of the Ilona River area in the southern Morondava Basin, western Madagascar, to determine their mode(s) of accumulation and paleoenvironmental conditions of formation. Shell beds are dense deposits of biological hardparts, and the exceptionally fossiliferous deposits addressed in this study, which have not previously been documented, record a key chapter in the history of the island during the time of its early isolation.

Shell beds are common features of the stratigraphic record, used by both paleontologists concerned with post-mortem bias of fossil assemblages and by geologists concerned with the determination of paleohydraulic regimes, facies analysis, and correlation. In this study, shell beds are classified based on hardpart richness in relation to dilution by sediment and association with different discontinuities (after Kidwell et al., 1986). Sharp contacts reflect distinct shifts in sedimentation and usually record an episode of erosion or omission; hardpart concentrations associated with sharp discontinuities are formed due to this change in net sedimentation. These shell beds typically occur above sharp discontinuities, suggesting they could reflect environments recovering from a period of omission or erosion, caused by a flooding event or subaerial exposure. These shell beds are typically associated with a burst of biological diversity that later dwindles, are deposited as densely packed assemblages above a sharp contact, and are deposited under low to moderate sedimentation. In the

Ilona River record, most fossils are echinoids, bryozoans, bivalves (especially oysters), gastropods, and ostracods, with minor constituents of forams, other echinoderms, and belemnites. The Ilona River area was a shallow marine environment, ranging from high-energy beaches to low-energy or deeper offshore settings, and the facies support an interpretation of the skeletal concentrations representing shell bed type III.

Supported by: FDC


**Andrew Jonna, '22**

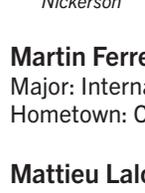
Major: Accounting  
Hometown: Bloomfield Hills, Michigan


**Ashley Ketchum, '22**

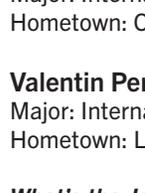
Major: Finance  
Hometown: Zeeland, Michigan


**Emily Merucci, '22**

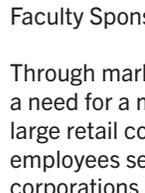
Majors: Business, Psychology  
Hometown: Grand Rapids, Michigan


**Claire Nickerson, '23**

Major: Finance  
Hometown: Battle Creek, Michigan


**Loris Bacca, '22**

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


**Audrey Comandini, '22**

Major: International Business Engineering  
Hometown: Versailles, France

**Martin Ferre, '22**

Major: International Business Engineering  
Hometown: Carrières-sur-Seine, France

**Mattieu Lalout, '22**

Major: International Business Engineering  
Hometown: Osmoy, France

**Valentin Perdriger, '22**

Major: International Business Engineering  
Hometown: Louveciennes, France

**What's the Job: A Digital Employment App**

Faculty Sponsor: Vicki Baker

Through market research we have determined that there is a need for a more efficient interview and hiring process for large retail companies. Our app, What's the Job, connects employees seeking a job in service and retail with large corporations looking to hire quality employees. This virtual platform provides the opportunity for employers to share videos of themselves describing the jobs they're hiring for and to watch videos of candidates who submit videos as part of a job application. Candidates are also able to schedule an interview, either online or in person, with

an employer. Our goals are to aid in the quick employee turnover rate and to minimize the amount of time a candidate spends in the interview and hiring process.



**Saige Jost, '22**

Majors: Geology, Spanish  
Hometown: Ann Arbor, Michigan

***Evaluating the Storm Export of Dissolved Organic Carbon from an Urban Environment to the Kalamazoo River, Albion, Michigan***

Faculty Sponsor: Joe Lee-Cullin

In order to evaluate the anthropogenic impact on freshwater ecosystems, it is important to assess the export of excess nutrients from the urban environment to the adjacent streams. We can investigate this by developing our understanding of one of these nutrients, dissolved organic carbon (DOC). Freshwater DOC is a combination of organic carbon derived from organic sources such as fallen leaves, grass, etc. This is important to measure because it's a key control on water quality and the ecology of stream networks, which includes influencing the control of nutrient cycles, food webs, and drinking water quality. Storm drains in urban watersheds act as a fast track to streams in comparison to the much slower, natural process of infiltration through soils. Infiltration through soils allows for solutes such as DOC to sorb to soil particles and provides ample time for microbial processing. Conversely, storm drains may convey solutes from the terrestrial landscape to the stream on a time scale orders of magnitude faster. Through sampling rainwater in gutters and near storm drains on the Albion College campus, we were able to evaluate how much DOC was entering the local stream system, the North Branch Kalamazoo River, from the urban watershed. Our results indicate that DOC values on campus ranged from < 2 mg/L up to 329mg/L during the 8 rain events. We can conclude from our research that large ranges of DOC are entering the local river from the urban environment during rain events.

*Supported by: FURSCA - Hyde Fellow in Student/Faculty Research*



**Noah Keck, '22**

Major: Computer Science  
Hometown: Frisco, Texas

***A Computational Investigation of Three-dimensional Sudoku Puzzles***

Faculty Sponsors: David Reimann, Drew Ash, Christopher Riedel

Sudoku is a popular puzzle where one must fill in the missing numbers so that each row, column, and nine 3-by-3 squares contain the numbers 1-9 exactly once. The puzzle contains a starting set of numbers, known as clues, which the player uses to find the solution through a process

of logical deductions. This talk explores mathematical concepts and algorithms for the generalization of these traditional Sudoku puzzles into three dimensions. Software was developed to allow users to generate three-dimensional Sudoku puzzles of varying sizes and solve them. The code development primarily utilizes the C# programming language and the Unity game engine to display a graphical output. Initial tests with three-dimensional Sudoku generation have shown a complex relationship between the number of clues provided in the initial puzzle and the generation time.



Kernen

**Diana Kernen, '24**

Major: Biochemistry  
Hometown: Keego Harbor, Michigan

**Noah Rollison, '24**

Majors: Biochemistry and Biology  
Hometown: Grand Blanc, Michigan



Rollison

***Synthesis of UV-Light Sensitive Nilotinib***  
Faculty Sponsor: Craig Streu

Chemotherapy drugs that target aspects of cell division and growth have been prescribed to cancer patients for decades. Often with these lifesaving treatments, patients experience life-altering side effects because the drugs not only target cancerous cells, but healthy ones as well. As such, improvements in drug targeting are among the most promising developments in cancer pharmacology. A particularly exciting method of targeting drugs is with light, which has spawned an entire field known as photopharmacology. A cornerstone of this field is azo compounds which are UV-light sensitive molecules. These compounds have begun to make their way into scientists' theoretical toolboxes over the last few years but are still a new approach to drug design. Since drugs bind to their targets as a result of shape and charge complementarity, the ability to change conformations in response to light allows the drugs to change from a deactivated "off" form, to an active "on" form. The drug's ability to be selectively switched on and off allows it to be administered in a deactivated state and only be activated at the site of the tumor with specific wavelengths of light. As a result, photopharmaceuticals have the potential to prevent patients from experiencing the adverse side effects of regular chemotherapy drugs. The goal of this research is to manipulate known chemotherapy drugs that have the ability to have a nitrogen-nitrogen double bond incorporated into them, thus converting them to photoswitchable azo compounds. Specifically, we are trying to synthesize an azo version of Nilotinib, a compound used to inhibit the BCR-ABL protein kinase, a fusion protein that results from errors in genetic recombination and leads to the development of chronic myeloid leukemia (CML) and acute lymphoblastic leukemia (ALL).

*Supported by: FDC*



**Meghan Krawczyk, '22**  
Major: Political Science  
Hometown: Bloomingdale, Illinois

***Empathy, Civic Engagement, and Political Polarization in College Students***  
Faculty Sponsor: Andrea P. Francis

The empathy-altruism hypothesis suggests prosocial behaviors (such as helping others) that arise from feelings of empathy are directed toward increasing the welfare of the person in need (Batson et al., 1991). Empathy is generally defined as sharing and understanding another person's feelings (Eisenberg, Eggum, & Giunta, 2010). Liberalism is a social philosophy that holds that radical innovation is needed to meet modern issues, whereas conservatism holds that one should maintain and respect tradition. Previous research suggests that liberals express more empathy than conservatives (Iyer et al., 2012). Both are looking out for the country, but in very different ways. Other research suggests that liberals and conservatives have varying levels of empathy towards those that share the same belief or do not share the same belief (Simas et al., 2020). This makes empathy particularly important in bridging the growing gap between liberals and conservatives. One way to increase empathy for those with different political values may be through civic engagement. Civic engagement includes political engagement (e.g., voting) and community engagement (Metzger and Smetana, 2009). This study was designed to assess whether civic engagement activities would predict empathy levels beyond personal political ideology.

In the present study, surveys were distributed to college students about their political ideology, empathy, and civic engagement judgements and activities. Participants were asked about three different categories of civic engagement: political, social, and community engagement. Results suggest that regardless of political ideology, levels of empathy are not impacted from political or social engagement. Rather, it is the community engagement that makes a difference.

*Supported by: FURSCA - Lawrence B., '72, and Frances Schook Research Fund*



**Ian Lee, '23**  
Major: English  
Hometown: Albion, Michigan

***Clouds: A Dissection of the Music of Zachary David Sobiech***  
Faculty Sponsors: Maureen Balke, Tammy Jechura, Lia Jensen-Abbott

Zachary David Sobiech was a Minnesota teenager when he died from osteosarcoma. He was a musically talented young man who wrote an entire album's worth of music about his experience dying of cancer. I am presenting about how this young man's music affects us emotionally years after he died and how his legacy lives on today.

**Brian Lomeli-Garcia, '23**  
Major: Biology  
Hometown: Los Angeles, California

***Regional Genetic Diversity of Aphid "Superclone"***  
Faculty Sponsor: Abigail Cahill

Previous studies of *Aphis nerii*, also known as oleander aphids, have shown that female aphids clone themselves and give birth to live young. Females do not sexually reproduce nor lay eggs; they clone many daughters instead. Aphids are therefore important for investigating the roles of genetic variation in populations. Previous studies have suggested that the oleander aphid has low genetic diversity, despite a large geographic range. Aphid populations are shaped spatially and temporally by habitat distribution, dispersal capabilities, and life cycle. Oleander aphids are found in warm climates where milkweeds are present, but evidence has shown that aphids are not present at Albion College during the winter due to the harsh living conditions. The aim of my study was to characterize the genetic variation that is found at Albion College compared to other populations in Michigan (Detroit, Holland, South Haven, Sault Ste Marie), Pennsylvania (East Stroudsburg), and Ohio (Cleveland), with the goal of gaining insight into the population dynamics, life history, and ecology of this well-established invasive species. A question I have in mind is if the habitat in Albion would result in differences between this population and other regional populations or if we can detect a migration of aphids at their geographic range. I hypothesize that the oleander aphids in the study at Albion College would consist of low genetic diversity, as I expect that aphids from different populations will also have similar genetic makeup, due to their clonality and long-distance dispersal.



**Olivia Lorenzoni, '22**  
Majors: Psychology, Art  
Hometown: Kingsford, Michigan

***Math Anxiety, Gender, and Problem Solving***  
Faculty Sponsors: Andrea Francis, Mareike Wieth

Students with math anxiety scored 34 points lower on a math examination, which is equivalent to almost a year of schooling (Pellicioni et al., 2016). Not only is math anxiety defined by mental confusion and helplessness but it is also associated with cognitive problems relating to working memory (Springer, 2007). Math anxiety affects female students more than male students (Frenzel, 2007). However, the research on the role of gender in convergent thinking is less clear (Abraham, 2016). Abraham (2016) found there were no differences in behaviors when asked to solve convergent thinking problems, but there seemed to be different neurological patterns between the men and women when using convergent thinking. Convergent thinking involves coming up with different ways to solve a problem and then choosing the best solution (Cropley, 2006). The current study was designed to elucidate the relationship between gender, level of math anxiety, and convergent thinking.

A total of 78 participants in Introductory Psychology courses completed a math anxiety rating scale, a non-math related convergent thinking task, and a math-related convergent thinking task. Results suggest men outperform women on the math-related convergent thinking task, and students with high levels of anxiety perform worse on the math-related convergent thinking task compared to the non-math-related convergent thinking task. Even after taking into account the relationship between gender and math-related convergent thinking, math anxiety still predicted performance on the math task. These results suggest that the perceived relationship between gender and convergent thinking ability is driven by math anxiety.

### **Chantz Marchetti, '22**

Major: English (Creative Writing Emphasis)  
Hometown: Detroit, Michigan

#### ***The British Blondes: An American Burlesque***

Faculty Sponsors: Maureen Balke, Stephanie Henderson, Helena Mesa

The British Blondes: An American Burlesque explores burlesque's rise to popularity in America through its most prolific actress: Lydia Thompson. Her controversial career and rise to stardom are presented in the form of a musical, to depict the genre's history through an original burlesque. This musical will bring attention to burlesque, its rich history, the women who created it, and their struggle with the xenophobic American press, toxic parasocial relationship with fans, and managers that disrespected the genre and its founders. Research was conducted by studying the memoirs and biographies of Lydia Thompson and her cast mates to accurately capture both the historical events that led to burlesque's rise and the voices of the historical figures behind it.

Supported by: FURSCA



### **Alyvia Martinez, '24**

Majors: Biology, Mathematics  
Hometown: Waterford, Michigan

### **Miles Newman, '25**

Majors: Biology, Communications  
Hometown: Rolesville, North Carolina



Rollison

#### ***Title of Research Project: Monitoring Invertebrate Biodiversity Inside and Outside of Rice Beds***

Faculty Sponsor: Abigail Cahill

We are studying the macroinvertebrate biodiversity in the Kalamazoo River. This river is home to wild rice beds, which are a vital nutrients source in the ecosystem, a nursery area for fish and amphibians, a water quality stabilizer, and a home to many organisms. We are trying to understand how much biodiversity lives within this patchy and seasonal

habitat. We made invertebrate collectors from Tupperware containers and placed them in different spots in the Kalamazoo River in August, 2021. These sites were inside and outside of wild rice beds. After two weeks, we removed the collectors and preserved the samples in ethanol. We sifted through them, using a microscope and dichotomous key, and counted how many of each species of invertebrate we found. We compared abundance, community composition, and diversity inside and outside the rice bed. We predicted higher abundance and diversity within the rice beds due to species interactions. We compared our data to previous data collected in October, 2020, and May, 2021, predicting that abundance and diversity would be highest in spring and summer. Finding the preference of these species will assist future studies of invertebrate specific niches. Our results will also aid initiatives to restore wild rice in the Kalamazoo River and elsewhere.



### **Paige McDowell, '24**

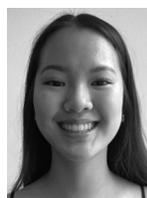
Major: Geology  
Hometown: Traverse City, MI

#### ***Boron Chemistry of Phengite from the Ultrahigh-Pressure Tso Morari Terrane, India***

Faculty Sponsor: Dr. Carrie Menold

The continental collision that resulted in the formation of the Himalayas showcases an important geologic process. At the very start of the collision, fluids from the subduction of Tethys Ocean are still present in the zone. The white mica, phengite, is a hydrous, high-pressure mineral that can preserve the chemical signatures of that fluid. The Tso Morari Ultrahigh Pressure (UHP) Terrane in NW India is a region of the Himalayas well suited for researching the importance and origin of fluids within subduction zones because it preserves early and deeply subducted rocks. Using three gneiss samples collected along a 10m traverse, we look at the mineral chemistry, trace element concentration, and boron isotope ratios of mica grains from each rock. The concentration of boron and mobile trace elements are proxies for the depth and source of the fluid, the boron isotopes indicate the extent of devolatilization (i.e. depth of subduction fluids).

Supported by: National Science Foundation



### **Alexis Moss, '24**

Major: Biochemistry  
Hometown: Bloomfield Hills, Michigan

#### ***Synthesis of Hemithioindigo Compounds as Microtubule Inhibitors***

Faculty Sponsor: Craig Streu

Cancer happens when cells lose the ability to regulate cell division. One critical process in cell division is the assembly of microtubules, without which the cell cannot divide. Given the importance of microtubule assembly to cell

division, a number of highly successful cancer drugs have been developed that interfere with this process. However, microtubule assembly is a process that is common to all cells and so these drugs have the potential for serious side effects that result from interfering with desirable microtubule assembly. One approach to limiting the off-target side effects of cancer drugs is to activate them selectively within cancer cells. One particularly exciting method for such selectivity is the use of light. For decades scientists in fields such as computing and energy have been developing molecules that respond reversibly to light with shape changes. However, only recently has their application to human medicine been fully realized. Specifically, these drugs can, if designed properly, be activated by light. Since biomolecular drugs target and recognize their targets based on shape and charge complementarity, structural changes in a drug following exposure to light can change the bioactivity of a drug. Fortunately, the carbon skeleton of a well-established tubulin polymerization inhibitor is almost structurally identical to a known photoswitchable molecule. My project is to synthesize a version of this photoswitch as a light-activated microtubule formation inhibitor. This talk will outline my progress toward the synthesis and diversification of this molecule.

*Supported by: FURSCA - Anna and Carl Weiskittel Endowed Chemistry Fellowship, FDC*

### **Enisa Muhaxhiri, '22**

Major: Biology  
Hometown: Gjakova, Kosovo

#### ***Electrocatalytic Decarboxylation of Amino Acids using Ruthenium of Activated Carbon Cloth (Ru/ACC)***

Faculty Sponsor: Benjamin Appiageyi

This research focuses on the development and the study of a heterogeneous catalyst, Ruthenium on Activated Carbon Cloth (Ru/ACC) to effectively decarboxylate several amino acids into amines. The process of decarboxylation is the removal of the carboxyl group from a compound, in this case, amino acids. Amines are used as solvents and also serve as building blocks in drugs and chemical synthesis. This project is designed to use water as a solvent and electricity as a chemical reagent. The process of decarboxylation happens as a result of the catalyst (Ru/ACC) removing electrons from the carboxyl group of the amino acid in a dilute phosphoric solution. The carboxyl group is then removed to form CO<sub>2</sub>, which bubbles out of the solution. Samples of the reaction solution are collected and NMR is used for observational analysis.



### **Katherine O'Connor, '22**

Majors: Political Science, Women's Studies  
Hometown: Lombard, IL

#### ***Epidemic Social Policy: How Failures of Leadership Created the HIV/AIDS and COVID-19 Crises***

Faculty Sponsor: Trisha Franzen

Of the epidemics of the last 60 years, HIV/AIDS and COVID-19 have been two of the most devastating. In both instances, an insufficient and impotent federal response contributed to the loss of thousands of American lives, as well as the devastation of disenfranchised communities. Prior research has documented policy failures related to HIV well, and ongoing research into the COVID-19 response has already uncovered startling truths about the missteps taken by the federal government. With the COVID-19 crisis being so new, little has been done to compare the two tragedies. By conducting a literature review, I have begun to do just that, investigating the breakdown of effective politics and policies in both situations, as well as the impact on our most vulnerable communities. Using the information collected, it has become clear that many of the mistakes made in the handling of the HIV/AIDS epidemic were repeated in the era of COVID-19, suggesting a failure to learn from past mistakes. Both cases were also characterized politically by a period of conservative backlash, and both had a disproportionate effect on vulnerable populations: LGBTQ+ people, Native people, and Black people, to name a few. Comparative work with these two epidemics and others would be a fruitful topic for further research, as identifying the key failures in governmental approach to epidemic response may help to improve future crisis interventions.



### **Chase Potter, '23**

Major: Biochemistry  
Hometown: Saranac, Michigan

#### ***Synthesis and Analysis of a Light-Activated Chemotherapeutic***

Faculty Sponsor: Craig Streu

Chemotherapeutics have been very effective in the treatment of various cancers; however, they have been shown to cause many off-target effects causing great side effects. One way to address this problem is to make kinase inhibitors that have increased specificity to the binding site of their intended target. These kinase inhibitors limit many side effects, but the specificity of these drugs is not perfect as this method still cannot generally eliminate all off-target effects. One way to improve these specific kinase inhibitors is by transforming them into photoswitchable pharmaceuticals, a class of drugs that can be activated and deactivated in response to light, which can be selectively applied to diseased tissue. Research in our group is focused on introducing an azo bond to a highly potent kinase inhibitor with notable side effects in an effort to improve its pharmacologic profile. Our goal is to target chronic myeloid leukemia (CML) by modifying a pre-existing drug, Imatinib.

Imatinib is an inhibitor of the bcr-abl enzyme, obtained through mutation and a known cause of CML. This project will outline the synthetic advances and challenges related to this approach to drug discovery.

*Supported by: FURSCA - Robson Family Fellow Endowment, FDC*



**Madeline Prall, '22**

Major: Anthropology  
Hometown: Traverse City, Michigan

***Inclusion of Native Voices in National Parks***  
Faculty Sponsor: Allison Harnish

National parks in the United States are often a family road trip destination. Fun hikes, ranger-led discussions, and seemingly untouched nature are the highlights of visiting such natural wonders. But, for Indigenous peoples, the US national parks frequently evoke a violent history of displacement. In addition, there has often been a lack of inclusion of Indigenous peoples in the educational (interpretive) history programs put on by rangers at national parks. Recently, some parks have begun to include Native languages in their websites and in the literature that is handed out to park visitors as a way to acknowledge the Native history. While section 106 of the National Historic Preservation Act calls for mandated consultations between national parks and federally recognized tribes, parks must take it a step further to create connections between themselves and the tribes that are associated with the land they are seeking to preserve. Through a summer internship at Sleeping Bear Dunes National Lakeshore (SLBE), I made connections with park administrators as well as a tribal consultant, who generously spoke through three interviews about efforts to promote inclusion and collaboration between US national parks and Native peoples. SLBE has made many steps through their interpretive program to include the Native voice in junior ranger packets, fireside talks, and an incoming flow of Anishinabek-centered waysides, but it still has work to do. Such work has been successfully modeled by parks such as Apostle Islands National Lakeshore.



**Austin Raymond, '23**

Major: Biology  
Hometown: Clare, Michigan

***Investigating DNA Repair Following Excision of the Hobo Transposable Element in *Drosophila melanogaster****  
Faculty Sponsor: Kenneth Saville

Repair of DNA damage is essential for survival in all organisms. A transposable element (TE) is a stretch of DNA that “jumps” out from one section of a chromosome and reinserts into another site. When a TE jumps out, it leaves a double-strand DNA break at the excision site, and this break needs to be repaired in order for the cell to

survive. In this experiment, a TE called hobo in *Drosophila melanogaster* was studied. The specific hobo element is called “HoP8” and is located on the X-chromosome, however, the exact location of HoP8 was unknown. My project was to first locate the precise location of HoP8 through the use of a technique called inverse PCR, followed by DNA sequencing. Inverse PCR suggested a location for hobo, but it turned out to be located within a repeated sequence that has similar copies throughout the genome. I designed specific forward and reverse primers based on known DNA sequences on the X chromosome and used these for PCR to confirm the location of the hobo insert. Once the location was determined, genetic crosses were used to make HoP8 jump out of its original location, then standard PCR was used to amplify the DNA remaining at the excision site. These crosses first resulted in somatic excisions, evident in the first generation of the cross. Crossing Hop8 males from this first generation to white-eyed females resulted in four female flies with white eyes and numerous males with red eyes. These females have likely undergone germ-line excision. The red eyed males indicate transposition, where hobo has jumped to a new, unknown location. Using DNA sequencing to analyze the somatic and germ-line excisions will provide information to characterize the DNA repair mechanism involved in repairing the DNA at hobo excision sites and help us understand DNA repair more generally.

*Supported by: FURSCA*



**Akaiia Ridley, '22**

Major: History  
Hometown: Albion, Michigan

***The Beginning of Belonging: Exploring the Black History of Albion College***  
Faculty Sponsor: Elizabeth Palmer

The Beginning of Belonging: Exploring the Black History of Albion College is a virtual exhibition that sheds light on the experience of being an African American student on Albion College's campus and on the faculty and staff that supported them. This exhibition acts as an opportunity for Black alumni and current students to share their experiences in forms that can be preserved in the College Archives and Special Collections for years to come. Viewers of this exhibition should walk away with a better understanding of the Black history of Albion College and the impact that these individuals have had on the campus. This project contains oral history interviews with Black alumni that were designed to allow them to tell their stories the way they want them to be told. Specifically, the exhibit includes stories about why these students decided to come to Albion, their experiences while they were here, the types of extracurricular activities they were involved in, and finally, whether or not they were truly supported by faculty and staff. Along with sharing the stories of Black alumni, I included the experiences of those who formed the support system for these students, such as members of the faculty and staff as well as members of the community of Albion.

*Supported by: FURSCA - Hyde Fellows in Student/Faculty Research*



**Sam Semerau, '22**

Majors: English, History  
Hometown: Oakland Township, Michigan

***The Opinion Section at War:  
An Exploration of The Pleiad's  
Opinion Section During Wartime***

Faculty Sponsor: Krista Quesenberry

The Pleiad has been Albion College's student-run news publication since 1883. In that time, The Pleiad has sought to nationalize the local, as well as localize the national, in its pages. Stories are presented in two main formats: news writing, unbiased reports based in fact and complemented with the attributes of those interviewed; and opinion writing, information from the perspective of the writer with the goal of persuading the reader toward a specific perspective. While The Pleiad has adjusted its contents since its inception, opinion writing has been consistently included. The opinion section of The Pleiad has provided a platform for student voices in the format of editorials, op-ed articles, and letters to the editor, among others. This platform has given us an insight into changing student perspectives on American involvement in the numerous military conflicts that have occurred since the Pleiad's inception. From the United States' entrance into World War I, to the American invasion of Iraq, Albion students have spoken their mind on the various wars happening in the world around them.

*Supported by: FURSCA / Richard L. and Barbara J. Meyer Student Research Endowment*



**Jonathan Stander, '22**

Major: Psychology  
Hometown: Grosse Pointe Woods, Michigan

***The Link between Gender-Based Object Perception and Beliefs about Gender as a Social Category in Bilingual Spanish and English Speakers***

Faculty Sponsor: Holger Elischberger

The linguistic relativity or Sapir-Whorf hypothesis suggests, broadly speaking, that language shapes thought. Numerous studies on phenomena as varied as color perception and support for gender equality have supported the connection between language and our beliefs and perception, while also demonstrating that language does not determine thought.

The current study measured the extent to which bilingual English and Spanish speakers' categorization of nouns followed the words' Spanish grammatical gender (la versus el), and whether this was linked to their gender role beliefs (e.g., what's appropriate behavior for women and men, respectively) and/or gender essentialist views (i.e., the belief that women and men are fundamentally different from one another due to biological reasons). Participants were shown a series of twenty images of animals, fruits, and objects and asked to assign each either a woman's or man's voice for an animated movie. Gender role beliefs and gender essentialism were assessed using published surveys.

As expected, bilingual participants' voice assignments were consistent with a noun's Spanish grammatical gender to a significantly greater degree (73%, on average) than those of a monolingual English speakers' comparison group (55%). Correlation analyses showed that individual differences in the extent to which bilingual participants followed Spanish grammatical gender in their voice assignments were independent both of how traditional or flexible their gender role beliefs are and how much they adhere to gender essentialist views. These findings are discussed in terms of the boundary conditions of the impact of gendered language on gender-related beliefs and perceptions.

*Supported by: FURSCA*

**Elizabeth Stout, '22**

Majors: Biology, Music  
Hometown: Augusta, Michigan

***Benefits of Telehealth in the Management of Children with Chronic Medical Conditions***

Faculty Sponsor: Meghan Webb

Chronic medical conditions such as asthma, epilepsy, obesity and autism spectrum disorder currently affect over 40% of school-age children, with large frequency increases in the past 50 years. Managing these types of conditions can be challenging for patients, families, and the medical community, especially in underserved areas. Telehealth, utilizing digital information and communication technologies to access and manage healthcare through methods like videoconferencing and virtual messaging, is one route to address these difficulties. Implementing a variety of types of telehealth programs at schools, clinics, and at home, working with caregivers, school nurses and employees, and other clinicians, has already shown benefits for managing chronic conditions in general and specific conditions like asthma, epilepsy, and diabetes. Studies have found improvements in symptoms and knowledge on managing conditions, increases in access to care, decreases in absenteeism from school and work, and reductions in out-of-pocket costs. Developing feasible and effective programs and increasing their usage faces barriers, such as technology deficiencies and access, concerns on privacy of information and regulation, and acceptance by families and providers from wide backgrounds. Addressing these and other current obstacles and adjusting to future changes can help ensure telehealth services remain available on a long-term basis and retain the potential to assist with the management of chronic conditions in children, reducing their negative impact.



### Edison Symons, '23

Major: Biology  
Hometown: St. Charles, Michigan

#### ***Decarboxylation of Amino Acids via Electrochemical Oxidation***

Faculty Sponsor: Benjamin Appiagyei

Amino acids are organic compounds that are the building blocks of proteins. For years they have also been a major part of the mainstream of waste products from agro-chemical industries and pretreatment of lignocellulosic biomass. For biomass carbon to effectively replace fossil carbon, all biomass carbon must be effectively utilized, and none lost to waste. Electrochemistry provides a clean and effective means to utilize biomass and replace the conventional non-green methods which pose danger to the environment with extremely high temperatures, high pressures, and non-green solvents conditions. Electrochemical decarboxylation of amino acids uses electrons (pure reagents) and electrodes (electrocatalysts) to remove the carboxyl component of amino acids. The possible outcome could be the formation of compounds such as nitrile, amine, aldehydes, etc. Our method of electrochemical decarboxylation is both effective and very selective in the formation of amines. Amines are used as precursors for making pharmaceutical drugs such as Adderall. Chemical industries use amines as absorbents, solvents, etc. Our method for converting wasteful amino acids to useful amine is achieved using an easily prepared electrocatalyst called ruthenium on activated carbon cloth (Ru/ACC). The solvent for our reaction is mainly water and the temperature is below the boiling point of water. Among other amino acids, we have currently converted L-serine, L-threonine, L-cysteine, L-proline, and L-histidine to their amine congeners. Our goal is to explore a large range of amino acids to gain a better understanding of the mechanism of the method, so we can apply it to actual mixtures of amino acids from the wasteful streams.



### Esmeralda Treviño, '22

Major: Psychology  
Hometown: Dallas, Texas

#### ***What Empirical Research Tells Us About the Benefits of Experiential Learning***

Faculty Sponsors: Shanti Madhavan-Brown, Barbara Keyes

The Albion College Psychology Practicum/Internship program (ACPPI) gives students insight into their professional skills and goals as well as an opportunity to enhance those skills and identify areas for growth. This program encourages students to apply their academic studies to a community-based placement while receiving guidance from experienced professionals and a faculty supervisor. The ACPPI emphasizes thought to action and learning through reflection.

We believe this program can serve as a prototype for other colleges that want to expand experiential learning opportunities for their students, but first we need to evaluate the effectiveness of the ACPPI by analyzing its success and areas for improvement. We began by reviewing studies of experiential learning education, particularly those that assessed student outcomes and emphasized holistic learning. This research will guide our program evaluation of the ACPPI and enable us to employ best research practices.



### Bryce Vandenburg, '22

Major: Biology  
Hometown: Jackson, Michigan

#### ***Identifying a Transcription Factor and Promoter for the Mating Type Genes of *Tetrahymena thermophila****

Faculty Sponsor: Marcella Cervantes

There are seven mating types of *Tetrahymena thermophila* which are controlled by two genes MTA and MTB. The mating type genes are co-expressed and are induced by starvation; however, the transcription factors for this mechanism are unknown. To obtain the transcription factor binding sites and potential transcription factors, the macronucleus was lysed, and the proteins were separated to identify transcription factors that bind to the potential promoter of mating type III. If there is a protein-DNA interaction between the hypothesized promoter and the transcription factor, it may be a transcription factor that is contributing to stimulating the mating type genes during starvation. To verify that the protein and DNA are binding, an electromobility shift assay (EMSA) will be used. When looking at the shift on the gel, if there are multiple shifted bands, it may indicate multiple promoters working on the MTA and MTB genes. Since MTB has been shown to be expressed more than MTA, having one gel band shift may indicate a single, inequivalent, bidirectional promoter. The general goal of this study is to identify a transcription factor and binding site of mating type III of *T. thermophila*. If the transcription factor is identified via mass spectrometry, the next step would be to verify if the transcription factor binding occurs throughout all seven mating types in *T. thermophila*.

Supported by: FURSCA - Orpha Leiter Irwin Fellowship

**Sam VanderVeen, '22**

Majors: Theatre, History  
Hometown: Grand Rapids, Michigan

***Cold War, Communism, and Christianity***

Faculty Sponsor: Dr. Joseph Ho

The Global Cold War was heavily influenced by many factors, but the religious factors leading to the division of ideologies are often overlooked in the general study of the Cold War. Religious paradigms led to the development of national biases and practices when it came to the rhetoric of Cold War propaganda and national identity. Specific countries exemplified these biases and practices, China, Cuba, the United States (US), and the Soviet Union (USSR), in particular. The connections and contrasts across the divide were something relatively unexplored through the lens of education to warfare. Analyzing propaganda and researching public opinion of small US liberal arts colleges via college papers and other archived documents allowed for a general understanding and led to an extended analysis of the Moral Re-Armament Movement. The underlying aspects of religion seep, deliberately or inadvertently, into national identity and propaganda when put against a contrasting ideology; educational institutions below higher education are geared toward indoctrination of these ideologies leading to higher distinction between higher education organizations.

*Supported by: FURSCA*

**Adam Walker, '22**

Major: Geology  
Hometown: Farmington Hills, Michigan

***Omphacite Chemistry of Eclogites from Tso Morari, India***

Faculty Sponsor: Carrie Menold

I am studying omphacite grains, a type of clinopyroxene present in metamorphic rocks called eclogites, obtained from Himalayan UHP terranes. Data will be collected on an LAICP-MS at U of M, which I will use to record the petrology of two samples of eclogites. The first, TM-15, is unweathered, while the second, TM-12, has been exposed to weathering. The data I will be looking for is zoning and identifying trace elements within the omphacite grains. This data will then be compared to previously collected data on iron isotopes from the same area. Iron isotope changes correlate with depth in the subduction zone, and the detailed chemical and petrological analysis of the grains will add important context to this study and aid in understanding the role fluids play in the creation of UHP rocks in subduction zones.

*Supported by: National Science Foundation*

**Ashlyn Wetzel, '22**

Major: Exercise Science  
Hometown: Stevensville, Michigan

***Assessment of Nutritional Knowledge in Division III Athletes***

Faculty Sponsors: Heather Betz, Julie Cousins, Meghan Webb

Nutritional knowledge is the amount of information, specifically on dietary needs, that a person gains from a variety of sources. Nutritional knowledge is necessary to maintain health and, for athletes, to prevent injuries. The purpose of this study was to describe nutritional knowledge in Division III college athletes. This study adds to the work of Werner and her study with Division I college athletes (Werner, 2021). A total of 182 (83 females) Albion College athletes (age 18-23 years) participated in this study. Participants were asked to fill out an online questionnaire covering demographic information (N=6), sports participation questions (N=5), and questions assessing nutritional knowledge (n=17). Participants represented 12 sports and ranged from first year students (N=59) to fifth year students (N=6). In the overall sample, correct answers ranged from a high of 98.9% (for the statement "Dehydration has no effect on my athletic performance") to a low of 23.6% (for the statement "The most important macronutrient to eat after weightlifting is protein"). There were significant sex differences in six of the 17 nutritional knowledge questions. When examined by whether the participant was a team vs. individual sport athlete, there were statistical differences in two of the 17 nutritional knowledge questions. Only one nutritional knowledge question ("The more protein I eat, the more muscle I will build") was significantly different when comparing by school year, and one ("Carbohydrates, as opposed to protein or fat, are the primary fuel for my muscles") was significantly different depending on whether they had previously taken a nutrition course.

**Ruark Wicka, '25**

Majors: Philosophy, Religious Studies  
Hometown: Royal Oak, Michigan

***The Relationship between Temple and Torah in the Late Second Temple Period***

Faculty Sponsor: Christopher Riedel

The religion of the Middle East in antiquity was heavily based on a physical location. Temples were the center of religious life, where priests would worship a god for the community, usually offering animal sacrifices as a way of appeasing a god. Religion in antiquity was tied to a distinct place and the worship within it. This was standard practice for ancient Israelite religion up until the destruction of Jerusalem and Solomon's Temple in 587 BC, when the upper classes of Jerusalem were deported to Babylon. In Babylon they had no Temple, which led to something drastic happening: the Israelites preserved their identity and religion by focusing on a scripture and

traditions which became to be known as the Law, or Torah. Eventually, the Persian Empire allowed the Jews to return and rebuild Jerusalem and its Temple. Thus in time the sacrificial cult of old Israelite religion coexisted with Torah-based religion of the returning exiles, which was manifested, among other ways, by the development of sects within Judaism identifying strongly with these two traditions, the Sadducees and Pharisees. It is my intention to explain the relationship between the Temple and the Torah within the Judaism of the Hellenistic era, showing how, instead of being in total opposition to one another, the Sadducees and Pharisees simply had very different interpretations of what the relationship between Temple and Torah was, with the Sadducees favoring the Temple at the expense of an expansive Halakhah and the Pharisees believing the opposite.

### **Samantha Zink, '23**

Major: Geology

Hometown: Winfield, Illinois

#### ***Assessing Biodegradation of Urban-derived Dissolved Organic Carbon at the Stream-groundwater Interface***

Faculty Sponsor: Dr. Joseph Lee-Cullin

In order to better understand human effects on the Kalamazoo River in South Central Michigan from our surrounding campus, we carried out experiments on locally-derived dissolved organic carbon (or DOC) in the summer of 2021. Inland water transportation of carbon is largely unaccounted for in global climate models, so measuring how DOC changes over time will be beneficial to future research on urban watersheds. Knowledge on the fate and transport of nutrients in these environments is increasingly important in our changing world. In this study, we tested DOC sourced from various locations on Albion's campus, and its ability to be broken down over time by organisms within the zone of stream-groundwater exchange. We measured this by simulating the stream in a lab using glass amber bottles, with combinations of streamwater, sediment, and concentrated DOC sources. Monitoring the change of DOC concentration over time gave us a better understanding of how different sources differ in how easily they are broken down by the organisms within the river water and sediments, compared to other sources. This gives us a better idea about how these nutrients are affected by their natural surroundings. Our results led to some unexpected conclusions about the similarities and differences between mixed and single sources of DOC tested from campus, and show surprisingly little statistical difference between running the experiment including or without river sediment. This was contrary to our expectations, and brings up further questions about DOC and its breakdown in urban water systems.

*Supported by: FURSCA - Julia Robinson Burd, '47, Research Endowment for Biology*

## About the Symposium

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

## The Elkin R. Isaac Endowment

The Elkin R. Isaac Endowment 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 are used to sponsor the Elkin R. Isaac Student Research Symposium.

## The 2022 Isaac Student Research Symposium Committee

Craig Bieler (Chemistry)  
 Andrew Christopher (Psychological Science)  
 Carrie Walling (Political Science)  
 Lisa Lewis (Chemistry)  
 Jill Marie Mason, Chair (Library)  
 Michael Dixon (Art and Art History)  
 Elizabeth Palmer (Library, Director of FURSCA)  
 John Perney (Marketing and Communications)  
 Erin Smith (Library)  
 Ashley Woodson (School for Public Purpose  
 and Professional Advancement)

## 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.

**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.





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