Elkin R. ISAAC

ALBION COLLEGE

EST 1990

STUDENT RESEARCH SYMPOSIUM

Thursday, April 13, 2023

Elkin R.

ISAAC

ALBION COLLEGE

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STUDENT RESEARCH SYMPOSIUM

9-10:15am | Student Research Platform Presentations

Forum #1 Norris 101

Forum #2 Norris 102

10:45am | Honors Convocation

Goodrich Chapel

1:15-4pm | Student Research Platform Presentations

Forum #1 – Norris 101

Forum #2 – Norris 102

Forum #3 – Norris 104

4-5pm | Student Research Poster Session

Science Complex Atrium

MORNING SESSION

FORUM #1 – NORRIS 101

9:00	Anthony Cardoso, Alicia Cherchouly, Cyrielle Deconninck, Amir Honeywood, Jacqueline Jozefczyk, Pierre Neyrinck, Rania Takib, Valentin Tourneret (Baker, Bruneteaux-Swann, Matthews, Young)	Tourist Untrapped
9:15	Romain Camus, Amelie Garnier, Thibault Grienet, Victor Guth, Erwan Henry, Sarai Martinez, Boris Penitzka, Cassidy Porter (Baker, Bruneteaux-Swann, Matthews, Young)	Algo-Rhythm
9:30	Charlyne Deludet, Vadim Derrien, Alexandra Foureau, Jérôme Godet, Alexa Hitchko, Jordan Labois, Mehdi Ouahmi, Ashley Pion (Baker, Bruneteaux-Swann, Matthews, Young)	E'Z Charge
9:45	Luke Mavis (Hooks, Li, Tatarczyck)	The Impact of International COVID-19 Travel Policy on Real Gross Domestic Product
10:00	Claire Nickerson (Baker)	Green vs. Green: Comparing Environmental and Financial Practices of Athleisure Companies

FORUM #2 – NORRIS 102

9:00	Shannon Barba, Karina Muñoz (Cho)	Synergistic Information Processing in Feedforward and Recurrent Neural Networks
9:15	Bach Tran (Cahill)	Predicting Head and Neck Cancers Treatment Response from MRI-LINAC Images Using Artificial Neural Networks
9:30	Victory Stovall (Quinney)	Comparative Historical Analysis: Birthed Through Racism; A Synopsis of American Obstetrics, Midwifery and Black Mother-Baby Mortality
9:45	Madisyn O'Dell (McCaskill, Godfrey)	Creating a Comprehensive List of Options to Receive Sustainable, Proper Preventative Oral Care
10:00	Eryn Lewis (McCaskill, Walling)	An Analysis of Mitigating Health Risks and Outcomes from Lead Exposure Using Nutrition

AFTERNOON SESSION

FORUM #1 – NORRIS 101

1:15	Kaylee Peterson (Balke, Laban)	*Flowers* from "Hadestown": A Comparison of the Greek Myths of Orpheus and Eurydice and Hades and Persephone in an Award-Winning Musical
1:30	Ashley Rocha (Balke)	Puccini's Aria "*La Canzone di Doretta*" from the Opera "Il Rondine"— New Love Awakened in a Kiss!
1:45	Brandon Blake (Abbott, Kim)	Edvard Grieg: Piano Concerto No. 1 in A minor, Op. 16
2:00	Megan Piontkowsky (Zellner)	The Future of Albion College Astronomy
2:15	Larenz Hill, Cedriana March (McCaskill)	Bridging Gaps: African American Male Higher Education and Graduation at Albion College
2:30	***break***	
2:45	Leone Macharia (Christopher)	Exposing Biases Held Against Transgender Individuals
3:00	Lily Miller (Hill, Madhavan-Brown, Myers)	Autism Spectrum Disorder, Applied Behavior Analysis, and Well-Being
3:15	Ian Lee (Roberts, Solomon)	Autism Representation from A-Z: Writing a Children's Book to Showcase the Autistic Experience
3:30	Sam Zink (Marshall, Merriman)	Modeling a Glass Ramp Paleoenvironment: Ceramic Demosponges of the Permian Phosphoria Rock Complex, Idaho

FORUM #2 – NORRIS 102

1:15	Alyvia Fondren (Francis, Zellner)	Women in Higher STEM Education
1:30	Megan McCulloch (Christopher, Hill, Madhavan-Brown)	Student Personality and Teacher Behavior Preferences
1:45	Emmet Burns (Jechura, Madhavan-Brown, Selleck)	The Effects of Pheromones on Resume Evaluation
2:00	Liv Dameron (Wieth)	The Creativity of Expert Athletes
2:15	Luke Rivard (Kay)	The Compositional Techniques of Irish Traditional Music
2:30	***break***	
2:45	Kenna Childress (MacInnes)	The Seven Ill Years: Encoding and Curating Pre-Modern Texts on Natural Disaster
3:00	Lucy Nevrly (Roberts)	Telling and Listening: Successful Storytelling According to William Faulkner
3:15	Jacqueline Best (Guenin-Lelle)	Cooking Up History: Race and Racism in New Orleans Creole Cookbooks
3:30	Mauricio Perez Garcia (Barrios)	Resilience by Means of Compliance: A Critical Examination of Borderlands/La Frontera's "New Mestiza" Identity
3:45	Lauren Farley (Demerdash)	Impacts of 20th Century Socio Political Conflicts on Contemporary Argentine Art Movements

FORUM #3 – NORRIS 104

1:15	Marcelle Collares (Kai-Liu, McRivette, Simons)	Approaches to Validating InSAR Time Series
1:30	Adia Langeland (Marshall)	An Anomalous Phosphatic Shell Bed: The Monospecific and Widespread Fish Scale Marker
1:45	Hayley Jonkman (Marshall)	Assessing Paleoenvironments of the Late Jurassic Ilona River Deposits, Morondava Basin, Western Madagascar
2:00	Austin Raymond (Saville)	Investigating DNA Repair Following Excision of the Hobo Transposable Element in Drosophila melanogaster
2:15	Breh Ruger (Cahill)	Distance from Prairies Strips and Cropping System Management as Effects on Natural Pest Suppression
2:30	break	
2:45	Brian Lomeli Garcia (Cahill)	Genetic Diversity of Aphid 'Superclone'
3:00	AJ Bieber (Wilch)	CSE's Experiential Learning Innovation Badges as a Gateway to Environmental and Social Change-Making
3:15	Marshall Wood (Olapade)	Determining Efficiency of Alcohol Fermentation Process Under Anaerobic Conditions Using Different Organic Substrates and Assessing Their Antimicrobial Potentials
3:30	Samantha Bieth (Madhok, Olapade, Saville)	Microbiological Characterization of P. aeruginosa Biofilms and a Philosophical Investigation of the Differences in Microbiological Education
3:45	Jared Nash (Zellner)	The Anti-Reflective Properties of Subwavelength Structures on Alumina Lenses

POSTER SESSION

SCIENCE COMPLEX ATRIUM, 4-5 P.M.

Ilsan Baigazy (Marengoni)	Detecting True Edges in PolSar Images using Artificial Intelligence.
AJ Bieber, Sid Childers, Riley Kunkel (Wilch)	Reinventing a Campus Bikeshare Program
AJ Bieber, Justin Loukotka (Lee-Cullen)	Remote Sensing of Freshwater Dissolved Organic Matter Using Remotely Sensed Surface Reflectance
AJ Bieber, Riley Kunkel, Justin Loukotka, Ashlynn Reed (Wilch)	Food Apartheid in Albion, MI through Experiential CSE Internships
Nina Bryde, Isaac Hautala, Kyndall Lewis (Wilch)	Sustainable Eating Habits Series
Avery Campbell (Lyons-Sobaski)	Population Genetics of Wild Rice (*Zizania palustris*) in South-Central Michigan
Virginia Cole, Alex Stevenson, Mikayla Stinde (Saville)	Using Comparative Genomics to Study the Muller D Element from *Drosophila kikkawai*
Abigail Coleman (Knowlden, Wilch)	Operation Bellemont
Rayna Edwards, Rebecca Ross, Angelique Wooley (Saville)	Gene Annotation of the Contig. 26 D. *kikkawai* D Element

POSTER SESSION CONTINUED

Jack Erickson, Alexander Unterriker (Saville)	GEP Parasitoid Wasp Project
Alyvia Fondren (Madhavan-Brown)	Making LGBTQIA2S+ Resources Accessible at Albion College
Evelyn Garduno (Franzen)	Beyond the Binary
Will Grout (Demerdash-Fatemi)	Analyzing Animal Rights Messaging through Patrick McDonnell's *MUTTS*
Samuel Helmbreck, Jesus Leana, Paige McDowell, Ashlynn Reed, Amali Turner (Wilch)	College Pollinator Project
Justin Loukotka, Haley Marion, Delia Nieves, Alaina Shephardson, Uma Shuford Williams (Wilch)	CSE Thrift Project
Alyvia Martinez, Breh Ruger (Saville)	Investigating the Euchromatic Reference Region of the Muller D Element in *Drosophila kikkawai*
Megan McCulloch (Madhavan-Brown)	Anxiety and Obsessive Compulsive Disorder (OCD) in Individuals with CHARGE Syndrome
Paige McDowell (Menold)	Chemical Heterogeneity in Phengite from the Ultrahigh-Pressure Gneiss, Tso Morari Terrane, India
Miles Newman, Adrian Sanchez (Cahill)	Methods for Monitoring Invertebrates in the Rice Beds
Cassidy Porter (Feagin, McCaskill, Solomon)	#OurAlbion
Elizabeth Powell (Solomon)	Experimentation for Art, Not Animals
Dylan Ranshaw, Bach Tran (Saville)	Annotating Lnk and Chico Genes within the Insulin/Insulin-Like Growth Factor Signaling (IIS) Pathway Across the Drosophila Genus
Ashlynn Reed (Franzen)	Exploring Food Stories in Albion
Kylie Roberts, Sarah Stovall, Michaley Vieau (Saville)	It Takes Three to Tango: Similarities of the Tango Gene in Multiple Drosophila Species
Sondra Sewell (Henke)	Annexation, Immigration, and Acculturation: How to Foster a Sense of Belonging in Students Who Attend School Outside Their Home Communities
Alaina Shepardson, Ikatari Swope (Cahill)	Aphids Effect on Milkweed Seed Production and Their Genetic Diversity
Trang Ha Tran (Price)	Social Media Marketing Improvement in Albion College Facility - Whitehouse Nature Center
Hunter Williams (Betz, Cousins, Webb)	Assessment of Nutritional Knowledge in Division III Collegiate Athletes
Sam Zink (Marshall, Merriman)	Museum Exhibit: Modeling a Glass Ramp Paleoenvironment: Ceramic Demosponges of the Permian Phosphoria Rock Complex, Idaho

Ilsan Baigazy, ’25
Major: Data Science
Hometown: Kyrgyzstan, Bishkek

Detecting True Edges in PolSar Images using Artificial Intelligence
Faculty/Staff Sponsor: Marengoni

PolSAR image is a relatively new technology that uses radar signals to acquire aerial images at any time of the day and in any weather conditions. These images come with a particular kind of multiplicative noise, called speckle, that requires a different approach from the ones used in optical images for most of the tasks in image processing. One of the tasks for which we don’t have a solution is edge detection. In this research, I compared Gambini’s algorithm, a well-known algorithm used for edge detection in PolSAR images, with some CFAR (Constant False Alarm Rate) algorithms in real and synthetic images. My main focus during this project was implementing a simpler version of edge detection algorithm for better understanding the concept. I used a program that converts images into matrices where each pixel (reflected microwave) is represented by a numerical value and goes through the whole matrix (image) and compares neighboring points in order to define if there is any contrast between them (edge).

Sponsored by: FURSCA - Jean Bengel Laughlin ’50 & Sheldon Laughlin Endowment

Barba

Shannon Barba, ’24
Majors: Physics, Computer Science
Hometown: Marshall, Michigan

Muñoz

Karina Muñoz, ’24
Majors: Physics, Applied Mathematics
Hometown: Dallas, Texas

Synergistic Information Processing in Feedforward and Recurrent Neural Networks
Faculty/Staff Sponsor: Demian Cho

The brain is a network of neurons that pass and receive chemical and electrical signals from other neurons. The purpose of our project is to see how the layout of said neurons can impact the speed and type of information received by the brain. MATLAB will be used to attempt to imitate a neuron from the McCulloch-Pitts model, the simplest computational model of the brain.

Supported by: FURSCA - Bruce A. ’53 and Peggy Kresge ’53 Endowed Science Fellow

Jacqueline Best, ’23
Majors: International Studies, French
Hometown: San Diego, California

Cooking Up History: Race and Racism in New Orleans Creole Cookbooks
Faculty/Staff Sponsor: Dianne Guenin-Lelle

Cookbooks, especially those written and published in New Orleans, provide more than just recipes. They serve a greater role in redefining cultural identities and preserving the dominant group’s power structure. This thesis, interdisciplinary in its approach, examines the history of the African connection to Creole food and culture while also investigating in detail the infusion of assimilationist, segregationist, and anti-racist thoughts in Creole cookbooks. A close textual analysis of a dozen cookbooks authored by White and Black individuals has revealed deliberate attempts to marginalize and, indeed, erase the Creoles of Color from history and their efforts to be reinscribed into the cooking and cookbook industries. New Orleans’ unique history along with its distinct cultural and racial identity, as well as its renowned region-specific gastronomic traditions have allowed for cookbooks to function as vehicles to both promote and combat racist ideologies associated with the Creole identity.

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

AJ Bieber, ’23
Major: Environmental Science
Hometown: Toledo, OH

CSE’s Experiential Learning Innovation Badges as a Gateway to Environmental and Social Change-Making
Faculty/Staff Sponsor: Thom Wilch

The innovation badges developed and sponsored by the Center for Sustainability and the Environment (CSE) recognize a student’s co-curricular experiential learning, professional development activities, and pursuit of specialized interests. As a CSE intern funded by AmeriCorps, I have had the opportunity to help craft and test the content of three new badges: Environmental Justice in Albion, Sustainable Living, and Inclusive Environmental Leadership. Students completing these innovation badges are gaining knowledge and developing skills that embody CSE’s mission to empower students to be environmental and social changemakers. Through these badges, we are advocating for not only the planet but for the people and voices that have been silenced within past environmental movements.

Students enrolled in the Environmental Justice in Albion and Sustainable Living badges have the opportunity to complete relevant activities, and reflect on environmental justice, risks, and sustainability solutions in the context of their lived experience and within the Albion community. The Inclusive Environmental Leadership badge exposes students to diverse environmental leadership and leadership styles, highlighting the intersections of our identities with environmental and social issues. Throughout the 2022-2023 year, I have met with my advisor weekly to discuss and revise content for these badges. In this position, I’ve become an environmental/sustainability explorer, always hunting for relevant and relatable content. As I work to find the most engaging and impactful material for my peers, I have been able to use my own privilege to advocate for other marginalized groups.

Supported by: CSE


Bieber

AJ Bieber, ’23
Major: Environmental Science
Hometown: Toledo, Ohio

Sid Childers, ’24
Major: Geology
Hometown: Holly, Michigan


Childers

Riley Kunkel, ’25
Major: Environmental Science
Hometown: Eaton Rapids, Michigan

Reinventing a Campus Bikeshare Program
Faculty/Staff Sponsor: Thom Wilch


Kunkel

In our fall 2022 Sustainability Projects course, our team developed a proposal and researched a variety of bike models to determine the best fit for long-term sustainability of a campus bikeshare program. Our vision for this project is to help reduce the College’s collective carbon footprint by creating a sustainable bicycle share program on campus. Our mission is to create a sustainable bikeshare program on campus that provides students access to a different mode of transportation, as well as offering a sustainable alternative to driving a car to class or in the community. We identified many stakeholders at Albion College who need to be consulted and involved in the implementation of a bikeshare program. We met with staff from Community Living, Facilities, SPP, and AmeriCorps during the semester to gather relevant stakeholders. We surveyed student interest at Green Day, and plan to meet with Campus Safety to establish a bike registration system.

After our meetings, we have determined that there is strong faculty, staff, & student interest in this project. This summer the CSE-AmeriCorps internship students will have the opportunity to move this project forward. Two vital parts of a sustainable bikeshare program are having spaces for storage and bike repair and a plan for bike repair. After learning about a 2009 bikeshare program on campus that did not persist, it’s important to us that we keep stakeholders involved as this project continues to develop.

Sponsored by: AmeriCorps, CSE


Bieber

AJ Bieber, ’23
Major: Environmental Science
Hometown: Sylvania, Ohio

Riley Kunkel, ’25
Major: Environmental Science
Hometown: Eaton Rapids, Michigan


Kunkel

Justin Loukotka, ’23
Major: Environmental Science
Hometown: Ann Arbor, Michigan

Ashlynn Reed, ’24
Majors: English, Environmental Studies
Hometown: Palmyra, Michigan


Loukotka

Food Apartheid in Albion, MI, Through Experiential CSE Internships
Faculty/Staff Sponsor: Thom Wilch


Reed

In the summer of 2022, six Albion College students served as sustainability interns through AmeriCorps and the Center for Sustainability and the Environment (CSE). The new summer internship program aimed to provide opportunities to engage in sustainability action on campus and in the community of Albion. Each day throughout the summer, student interns worked as a team, helping to address local food apartheid through partnerships with the Albion Community Gardens and the Student Farm. By the end of the summer, the interns had helped grow and distribute over 3,000 pounds of produce. In addition to working at the Community Garden and Student Farm, the students also worked alongside campus Facilities and Grounds departments on other projects and created a CSE blog. With their hard work and persistence, these students established mutually beneficial partnerships with community members and gained skills in gardening, communication, and leadership. The students were able to tackle community-wide human rights issues, such as food and environmental justice in Albion, all the while witnessing the effects of these issues on a community that they have grown to call home. In this poster, we will discuss how sustainable gardening can promote sustainable communities and emphasize the importance of food sovereignty.

Sponsored by: CSE, AmeriCorps


Bieber

AJ Bieber, ’23
Major: Environmental Science
Hometown: Toledo, Ohio

Justin Loukotka, ’23
Major: Environmental Science
Hometown: Hell, Michigan


Loukotka

Remote Sensing of Freshwater Dissolved Organic Matter Using Remotely Sensed Satellite Surface Reflectance
Faculty/Staff Sponsor: Dr. Joe Lee-Cullin

Dissolved organic matter (DOM) controls biogeochemical cycling, water quality and energy flow in stream environments. Fluorescent dissolved organic matter (fDOM) is a fraction of the DOM optical properties that fluoresces and can be assessed using remotely sensed data using the USGS Landsat Surface Reflectance. Several marine-focused methodologies have used Landsat 8 in such a manner, but little is known about its ability to approximate biogeochemical conditions in streams. Here, we hypothesize that there will be a correlation between DOM measurements taken in the stream and surface reflectance conditions observed through the Landsat program. To test this hypothesis, we sampled across several freshwater locations with measurements timed to approximate a Landsat flyover and measured for dissolved organic carbon, a portion of the stream DOM that is sometimes approximated using fDOM measurements.

Sponsored by: FURSCA - Semester Grant

Samantha Bieth, ’23
Major: Biology
Hometown: Marine City, Michigan

Microbiological Characterization of P. aeruginosa Biofilms and a Philosophical Investigation of the Differences in Microbiological Education
Faculty/Staff Sponsors: Bindu Madhok, Ola Olapade, Ken Saville

Pseudomonas aeruginosa is an opportunistic pathogen of increasing global concern, particularly in clinical settings. Due to its complex physiology and consequential antibiotic resistance capabilities, finding new antibiotics to treat P. aeruginosa infections is considered of critical importance by the World Health Organization. A causative characteristic of this affinity for antibiotic resistance is biofilm formation, which P. aeruginosa may demonstrate between cells of its own species or together with bacteria such as E. coli. The first part of my research investigates P. aeruginosa biofilm formation on various substrates from differing environments and evaluates morphological, physiological and biochemical characteristics of each culture. I then take a broader, more philosophical look at microbiological education as a whole, discussing the implications of differing classroom content on society’s collective understanding of microbiology. We frequently compare the quality of education when searching for which college to attend or evaluating prospective employees, but rarely are the consequences of such educational differences explored. I work to communicate the benefits and detriments of such diverse education and how our health may be influenced by the information determined pertinent by any given institution.

Supported by: FURSCA - Semester Grant

Brandon Blake, ’26
Majors: Mathematics, Music Performance
Hometown: Holland, Michigan

Edvard Grieg: Piano Concerto No. 1 in A minor, Op. 16
Faculty/Staff Sponsors: David Abbott, Ji Hyun Kim

Edvard Grieg’s Piano Concerto No. 1 in A minor is one of the most beloved piano concertos from the Romantic Period. Originally published in 1868, the first movement is known for its unusually dramatic opening, as well as its virtuosic cadenza. Grieg combined technical passages with lyrical melodies to paint scenes of the Nordic landscape and expressed his ideas using Norwegian folk tunes and dances, which are especially prominent in the third movement.

On February 3rd, 2023, I participated in the Albion College Concerto and Aria Competition, an externally adjudicated event sponsored by the music department. As the winner of the competition, I have been selected to present an abbreviated version of the concerto’s first movement with a piano accompaniment for the Elkin R. Isaac Student Research Symposium. On Sunday, April 16th, at 4:00 p.m., I will be giving a complete performance of the first movement in Goodrich Chapel with the Albion College Symphony Orchestra, directed by Dr. Ji Hyun Kim.

Bryde

Nina Bryde, ’23
Majors: Environmental Studies, History
Hometown: Davisburg, Michigan

Isaac Hautala, ’25
Major: Geology
Hometown: Caledonia, Michigan

Hautala

Kyndall Lewis, ’25
Major: Environmental Studies
Hometown: Albion, Michigan

Sustainable Eating Habits Series
Faculty/Staff Sponsor: Thom Wilch

Lewis

The Sustainable Eating Habits Series is a project stemming from the Sustainability Projects class (ENVN 287/288), wherein student teams proposed and developed a project that furthered sustainable initiatives at Albion College. Eating sustainably is a practice in which individuals are conscious of the relationship between food and the environment, and how we can improve our own health and the health of our ecosystems. This may appear as eating alternative proteins, vegan and vegetarian options, and cutting out foods that are environmentally taxing.
The goal of this project was to educate and encourage the Albion College community towards simple changes that can lead to more sustainable diets. We were able to achieve this goal through a partnership between the Center for Sustainability and the Environment (CSE) and Metz Dining Services. This partnership enabled us to present benefits of sustainable eating practices and consequences of unsustainable practices at Lower Baldwin hall during lunch, once per month.

We developed themes for each Sustainable Eating Day, including the body, the mind, the environment, waste production, and animals. Each event was planned with Metz Dining and CSE staff in order to tailor the menu to our theme and successfully educate the community on how eating sustainably sourced and produced food can affect them and the world. Not only has this project educated the Albion College community, students from the Sustainability Projects class have learned how to design and execute sustainable and successful projects through collaboration with other organizations.

Sponsored by: CSE

Emmet Burns, ’23
Major: Psychology
Hometown: Traverse City, Michigan

The Effects of Pheromones on Resume Evaluation
Faculty/Staff Sponsors: Tammy Jechura, Shanti Madhavan-Brown, Ryan Selleck

The hiring process requires careful consideration of an individual’s resume in order to assess their qualifications and gain insight into the person behind the words. Androstadienone (AND) is a putative male-produced pheromone shown to impact individuals’ information processing and perception of others. In this experiment, we predicted that AND exposure would increase desirability

to hire an applicant and would increase perceived ratings of personality traits. Participants exposed to AND on resume materials showed an increased desire to hire the applicant compared to the control group not exposed to AND. Participants exposed to AND also perceived the applicant as being higher in certain personality traits, including agreeableness, extraversion, and openness, when compared to the control group. There was a trend toward a significant effect for conscientiousness as well. These effects were more pronounced in women, as would be expected from a male-derived pheromone. This study provides more evidence that AND acts as a true pheromone and shows that the pheromone influences the evaluation of individuals via a paper resume.

Supported by: Neuroscience Concentration at Albion College

Avery Campbell, ’24
Major: Biochemistry
Hometown: Waterford, Michigan

Population Genetics of Wild Rice (Zizania palustris) in South-Central Michigan
Faculty/Staff Sponsor: Sheila Lyons-Sobaski

Wild rice, Zizania palustris, is a native aquatic plant within the state of Michigan. It is a sacred plant that is a food source for Anishinaabe peoples in the Great Lakes region. However, the species has experienced a decline in population numbers. Thus, restoration efforts have been implemented to restore this aquatic grass throughout the region. I wanted to understand how restoration efforts influenced the genetics of current populations. In particular, I was interested in comparing the genetic structure of wild rice populations in reseeded versus non-reseeded areas in south-central Michigan. I hypothesized that wild rice populations would be genetically similar due to the deliberate planting of seeds by indigenous people both historically and in the present time. This past summer, I collected samples of wild rice from populations in Calhoun and Allegan Counties. I screened and optimized several microsatellite genetic markers using the polymerase chain reaction, as well as capillary electrophoresis. This work will ultimately contribute to understanding how restoration efforts influence the genotypic makeup to be made between different wild rice populations in the region, and help understand how the populations evolve.

Supported by: FURSCA - Robson Family Fellows

Camus

Romain Camus, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Amelie Garnier, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Garnier

Thibault Grienet, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Victor Guth, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Grienet

Erwan Henry, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Sarai Martinez, ’25
Major: Marketing management and communication
Hometown: Dallas, Texas

Guth

Boris Penitzka, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Cassidy Porter, ’23
Major: Business
Hometown: Albion, Michigan

Henry

Algo-Rhythm
Faculty/Staff Sponsors: Vicki Baker, Catherine Bruneteaux-Swann, Roy Matthews, Stephen Young

Martinez

Penitzka

Porter

“Algo-Rhythm” is an application dedicated to boosting retail sales by enhancing customer experience through an easy-to-use and stress-reducing playlist generator. The driving decision to enhance the customer experience is the years of data research on store atmospherics. Store atmospherics is the idea that all senses of a customer should be appealed to and balanced to create the best shopping environment possible. Our app is designed to create a playlist that best matches the store by using factors such as store type, temperature, weather, lighting, time of day, and number of customers in the store with the possibility of incorporating AI technology to help analyze these factors. After completing our market research we discovered that customers are influential in the music selection portion. Not only that, they often go out of their way to change other components of the music being played. Therefore, we add an interactive experience to Algo-Rhythm to allow customers to queue songs from the store’s curated playlist. In turn, we have five close competitors. Most operate through monthly subscriptions, like Algo-Rhythm would be designed. We set ourselves apart from the competitors by including AI analysis to change the playlist throughout the day. We focus on eight target industries including: fashion retail stores, hotels, restaurants, boutique stores, headquarters, big retail, grocery stores, and luxury stores. However, medium sized retail stores are our main focus to build credibility through seeing the correlation of using the app and the increase in sales.

Cardoso

Antony Cardoso, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Alicia Cherchouly, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Cyrielle Deconninck, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France


Cherchouly


Deconninck


Honeywood


Jozefczyk


Neyrinck


Takib


Tourneret

Amir Honeywood, '24
Majors: Economics and Management, International Studies
Hometown: Kalamazoo, Michigan

Jacqueline Jozefczyk, '24
Major: Integrated Marketing Communications
Hometown: Macomb, MI

Pierre Neyrinck, '24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Rania Takib, '24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Valentin Tourneret, '24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Tourist Untrapped
Faculty/Staff Sponsors: Vicki Baker, Catherine Bruneteaux-Swann, Roy Matthews, Stephen Young

"Tourist Untrapped" is a unique and exciting way to introduce tourists to the spots only known by locals in two ways. First, small businesses can utilize our app to offer perks for new customers to encourage customer visits and make the trip a memorable experience. Second, tourists have a more exciting stay in their new city by avoiding the typical tourist traps and by discovering new places and attractions not found in the typical tour guidebook. The purpose of the application is to promote local products, activities, and experiences according to the wants of both local businesses and tourists. Our app offers choices between different excursions and types of tours that can be guided, either by a local tour guide or the built-in integrated GPS system. As the world returns to traveling and exploring new cities, our data suggest that many would prefer local interaction and attractions that are off the beaten path. "Tourist Untrapped" offers a twofold approach to promoting local businesses and the tourism industry by creating unique experiences for the tourist all the while assisting local businesses.

Kenna Childress, '23
Major: English
Hometown: Berkley, Michigan

The Seven Ill Years: Encoding and Curating Pre-Modern Texts on Natural Disaster
Faculty/Staff Sponsor: Ian MacInnes

Following two consecutive national harvest failures in 1695 and 1696, the privy council of Scotland stated that the nation was experiencing a famine "which is more sensible than ever was known in this Nation.". In the end, this famine, called "The Seven Ill Years," would take the lives of nearly 15% of the population. The goal of this project is to curate a list of primary sources from 1695 and 1696 that contain information about the Seven Ill Years and to begin creating a TEI encoded version of these sources. These TEI encoded texts will be my contribution to a larger project (organized by Dr. MacInnes) to create an online database of pre-modern natural disaster narratives (before 1800).

Supported by: FURSCA - Bethune Fellows Student Research Endowment


Cole


Stevenson


Stinde

Viriginia Cole, '24
Major: Biology
Hometown: Southfield, Michigan

Alex Stevenson, '25
Major: Biology
Hometown: Sterling Heights, Michigan

Mikayla Stinde, '23
Majors: Biological Sciences, Anthropology/Sociology
Hometown: Holly, Michigan

Using Comparative Genomics to Study the Muller D Element from Drosophila kikkawai
Faculty/Staff Sponsor: Ken Saville

The Genomics Education Partnership (GEP) is a nationwide collaboration of 200+ institutions that assist in comparative genomics. In Drosophila melanogaster, the Muller D element is a euchromatic region that is used for comparative analysis against the Muller F element, which has a unique structure consisting of a high degree of heterochromatin. The goal of the F element project is to look for changes in the sequences to study the evolution occurring. As a member of the Bioinformatics course at Albion College, numerous web-based tools are used for accuracy while annotating from the genome of Drosophila kikkawai. BLAST is used for locating the exons along the various isoforms through the UCSC genome browser. Gene Models are verified through Gene Model Checker, a program that generates final coordinate alignments and dot plots to provide accurate coordinates. Our contig (contig33) has six different genes in our annotation with a range of isoforms from 2-3 variants. We will report the detailed annotation of all isoforms including our proposed new gene models for each.

Abigail Coleman, '24
Majors: Environmental Studies, Psychology
Hometown: Holland, Michigan

Operation Bellemont
Faculty/Staff Sponsors: Lindsey Knowlden, Thom Wilch

Bellemont Manor, located just off campus, is a beautiful college-owned building which used to serve as a space for conferences, weddings, reunions and other college functions. After the building was closed to the public several years ago, it has been used to store antiques, furniture, kitchen equipment, and other assorted surplus items. The Albion College AmeriCorps program and the Center for

Sustainability and the Environment began a conversation with Albion College Business Office and Facilities Department to explore a long-term, sustainable way to manage these goods. Data shows that over 12 million tons of furniture gets sent to the landfill each year. Our goal was to stop that from happening and put the items in Bellemont to good use. Sustainable methods for this project include restoration, upcycling, reselling, donating and recycling items. Any funds raised through this process will be added to the revolving Albion College green fund, an internal financial pool dedicated to funding student-led energy efficiency, renewable energy, and sustainability projects on campus.

Sponsored by: AmeriCorps, CSE

Marcelle Collares, ’23
Major: Geology
Hometown: Rio de Janeiro, Brazil

Approaches to Validating InSAR Time Series
Faculty/Staff Sponsors: Yuan Kai-Liu, Michael McRivette, Mark Simons

InSAR is a remote sensing technique in which two radar images are compared - one before the ground has been deformed and one after - allowing information on the amplitude and the phase of the ground surface at a certain time to be analyzed. It is a powerful technique to monitor land earthquakes, thus improving our understanding of them. Furthermore, ground deformation occurring through the whole earthquake cycle can be measured by InSAR, and tectonic processes can be more easily understood using this geodetic method. The NASA-ISRO SAR (NISAR) Mission, a partnership between India and the United States, will use InSAR to determine the likelihood of earthquakes and assess geologic and anthropogenic hazards. This will help monitor infrastructures and planning for risk management. My work aims to determine the effectiveness of the present approaches in evaluating the satellite’s earthquake measurements, taking into account secular, coseismic and transient displacements.

Supported by: Caltech WAVE Fellows Program, FURSCA, & NASA’S Jet Propulsion Lab

Liv Dameron, ’23
Majors: Psychology, Spanish
Hometown: Macomb, Michigan

The Creativity of Expert Athletes
Faculty/Staff Sponsor: Mareike Wieth

Athletes’ familiarity with the skills of a sport enhances creative team play and performance. Research on expertise and creativity, however, has found greater functional fixedness in experts than non-expert. Functional fixedness is a mental block when trying to use an object in a non-commonly used way. The current study asked expert athletes to generate creative uses for a sport-specific item, an other-sport item, and a non-sport item. If expertise leads to functional fixedness, expert athletes should generate the least number of creative uses for the item used in their sport (e.g., lacrosse stick for lacrosse players). On the other hand, if expert athletes are more creative, then athletes should generate more creative uses for the item used in their sport. A total of 85 lacrosse and basketball athletes listed creative uses for a lacrosse stick, a basketball, and an eraser. Results showed that lacrosse players listed more creative uses for their sport-specific item (lacrosse stick) compared to the other-sport item (basketball) and the non-sport item (eraser). These findings support previous research indicating that athletic expertise leads to greater creativity, but only in the specific domain of expertise (lacrosse). For basketball players, the data neither supported the theory proposing that expertise leads to greater creativity or the theory proposing that expertise leads to functional fixedness. These findings imply that for lacrosse players, athletic expertise leads to greater creativity for tasks related to lacrosse, while for basketball players, athletic expertise did not influence creativity differently.

Deludet

Charlyne Deludet, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Vadim Derrien, ’24
Major: Business Engineering
Hometown: Saint Germain en Laye, France

Derrien

Alexandra Foureau, ’24
Major: Business Engineering
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Major: Business Engineering
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Foureau

Alexa Hitchko, ’23
Major: Business
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Major: Business Engineering
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Godet

Mehdi Ouahmi, ’24
Major: Business Engineering
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Ashley Pion, ’23
Majors: Human Resources, Communication
Hometown: Edwardsburg, Michigan

Hitchko

E’Z Charge
Faculty/Staff Sponsors: Vicki Baker, Catherine Bruneteaux-Swann, Roy Matthews, Stephen Young

Labois

As electronic devices become even more paramount in today’s dynamic and global workplace, the challenge of finding an effective and efficient means to charge these devices has grown. Our company, E’Z Charge, has a solution to this problem—wireless charging technology. Our product was first inspired by portable charging systems, but we have elevated the capability with small mats that can charge laptops and other devices. Our mats accommodate any potential consumer by operating with any technological brand. As a service-oriented company, we

Ouahmi


Pion

install these mats onto tables in commonly used meeting spaces to meet your demand. Our primary consumers include global organizations that utilize common and shared workplaces that have a high demand for easy charging solutions, such as conference centers, collaboration rooms, and community workspaces.


Edwards

Rayna Edwards, ’23
Major: Biology
Hometown: Manchester, Michigan

Rebecca Ross, ’23
Major: Biology
Hometown: Gaylord, Michigan


Ross

Angelique Wooley, ’23
Major: Biology
Hometown: Bay City, Michigan

Gene Annotation of the Contig 26 D. kikkawai D Element
Faculty/Staff Sponsor: Ken Saville


Wooley

Our project focuses on partnering with the Genomics Education Partnership (GEP) to annotate the contig26 gene within the D. kikkawai species. GEP is an organization that provides opportunities for experiential learning in genomic and bioinformatic undergraduate research. Specifically, we will be working with the F element project in which we will produce annotations for the coding region in D. kikkawai using a reference region in the Muller D element. We use tools such as the UCSC Genome Browser, NCBI-Blast, Flybase, Gene Record Finder, and Gene model checker to annotate the gene. Ultimately, the project will examine factors that have led to the expansion of F element in the D. kikkawai species and determine the impact expansion has on gene characteristics. Furthermore, our goal is to illuminate evolutionary effects of changes in chromosome and gene size.


Erickson

Jack Erickson, ’25
Majors: Biology, German
Hometown: Midland, Michigan

Alexander Unterriker, ’23
Major: Biology
Hometown: Appleton, Wisconsin


Unterriker

GEP Parasitoid Wasp Project
Faculty Sponsors: Ken Saville

The Genomics Education Partnership (GEP) is a scientific and educational partnership that utilizes comparative genomics to study gene evolution. A new project launched by the GEP is focused on genes that encode venom proteins in three different parasitoid wasp species. These parasitoid wasps are significant to this project as they infect many different Drosophila species, and represent an interesting evolutionary strategy. Our overarching goal is to evaluate the evolution of these venom encoding genes throughout different species. This will be done by creating a model of each gene by comparing data shown on the GEP Genome Browser against the genes’ ortholog in the species N. vitripennis and the experimentally derived RNA seq data. The gene we chose to annotate was in the species Leptopilina heteroma and had the ortholog NP_001157191.1. Initial analysis of this gene has shown it to be the ortholog of Actin-5C, which encodes a critical component of the cytoskeleton in all cells. The evolution of this gene across wasp species will be reported.

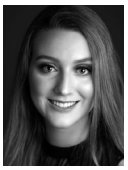
Lauren Farley, ’23
Majors: Art History, Spanish
Hometown: Plano, Texas

Impacts of 20th Century Socio-Political Conflicts on Contemporary Argentine Art Movements
Faculty/Staff Sponsor: Nancy Demerdash

Argentina faced many challenges in the 20th century including a dictatorship, a war with England, and a never-ending battle for economic prosperity. During these different struggles, Argentineans expressed their emotions about these events through art, oftentimes risking their lives and livelihoods as a result. Starting with Realism in the beginning of the century, we can easily see the impacts of industrialization with the creation of a new working class and the struggles they faced: no worker’s rights, exhaustion, and starvation. Entering the 1930’s we begin to see the rise in Surrealism, as in Europe, as a way of coping with the conflicts happening globally. For example, the horrors of the Spanish Civil War causing many Spaniards to emigrate to Argentina, the rise of the Nazi party in Germany, as well as a coup happening in Argentina itself.

Next, in the 1960’s, during a period of violent military conflicts, two very powerful movements emerged: Social Neorealism and Neo-Figurative Art. Social Neorealism, like the Realism fifty years before, details the hardships of the everyday citizen incorporating themes that are especially hard to talk about, like prostitution, child homelessness, and the negative effects of capitalism. Neo-Figurative art uses aggression, chaos, and a unique way of expression to highlight the suffering of the people with its peak being thirty years later in its depictions of the horrors of the military dictatorship. Through these art movements, we can directly see public attitudes towards the ever-changing political situation of Argentina, as well as the use of art as a method of coping with extreme hardships and suffering.

Sponsored by: La drum Fellowship



Alyvia Fondren, ’23
Major: Psychology
Hometown: Ida, Michigan

Women in Higher STEM Education
Faculty/Staff Sponsors: Andrea Francis, Nicolle Zellner

Despite making up nearly half of the workforce, the 2019 US Census indicated only 27% of the science, technology, engineering, and mathematics (STEM) workforce was made up of women. One way to encourage women to continue in STEM careers may be to increase representation in

higher education. There is burgeoning evidence showing that interventions with female role models can increase girls' preferences for STEM careers and their expectations of success in math. While previous studies on the effects of STEM role models have studied female participants in middle school, high school, and at the undergraduate level, we do not know of any studies that have specifically examined the influence of female mentorship in higher education (Masters and PhD programs) on STEM career decisions.

Using an online survey to collect data, this study examined the mentorship experiences of women in graduate STEM programs, including whether they had a STEM mentor, the gender of their most influential STEM mentor, mentorship qualities, and how mentorship affected their decision to remain in STEM. Women also answered demographic questions, including undergraduate institution size and graduation year. Findings suggest there may be more women mentors in higher education STEM fields overall compared to previous decades. Importantly, while there were no overall characteristic differences between male and female mentors, women who said they had female mentors were more likely to indicate that they would not have remained in STEM otherwise.

Sponsored by: FURSCA - Semester Grant

Alyvia Fondren, '23
Major: Psychology
Hometown: Ida, Michigan

Making LGBTQIA2S+ Resources Accessible at Albion College
Faculty/Staff Sponsor: Shanti Madhavan-Brown

According to the National Center for Education Statistics, sexual orientation biases made up 22% of motivating factors of hate crimes reported in 2018 at post-secondary institutions. In order to combat hate and discrimination on college campuses, it's important for schools to maintain an inclusive campus climate that condemns any forms of discrimination on the basis of one's identity to help their LGBTQIA2S+ students feel safe and welcome. Additionally, the Trevor Project's 2022 National Survey on LGBTQ Youth Mental Health found that LGBTQ youth who lived in accepting communities and had access to LGBTQ-affirming spaces had significantly less reported suicide attempts compared to those who didn't. Albion College promotes an inclusive and diverse campus community, but unlike other schools, we haven't previously had a resource page for the LGBTQIA2S+ community. By creating a resource page on Albion's website that can serve the current LGBTQIA2S+ community on campus, this project will help create space for future students on campus and demonstrate to them that Albion promotes an inclusive campus climate by making sure that resources are readily available and accessible. The webpage is based off of a review of various literature including scholarly journals regarding best practices for LGBTQIA2S+ individuals on college campuses, interviews with Albion faculty, and interviews with LGBTQIA2S+ students on campus. This webpage can help put Albion College on the map as a school that proudly stands with the community, facilitates affirming resources, and continues to develop systems of support that protect the identity rights of their students.

Evelyn Garduno, '23
Major: Art
Hometown: Dallas, Texas

Beyond The Binary
Faculty Sponsor: Trisha Franzen

Across the globe, religious or cultural customs have often prohibited public discussions and representations of gender and sexuality. As a result, many people in the LGBTQIA+ communities have had to grow up and live in societies that isolated them, oppressed them, and allowed no representation of them in the media. Until recently, this was true even in the art world. There was no demand for queer art or artists to be exhibited inside gallery spaces or museums, producing an art history curated of only master works that were made by white, cis-gender males. My work examines some of the pioneering artists who identify beyond the binary and are creating spaces where alternative genders and sexualities can be discussed within the art world. In building this exhibit, I have asked how artists create queer spaces and queer intimacy.

Edith R. Gonzalez, '23
Majors: Biochemistry, Public Health
Hometown: Los Angeles, California

Understanding Attitudes and Habits Regarding Data Use and Sharing in Advancing Materials Research
Faculty/Staff Sponsor: Lisa B. Lewis

The Materials Genome Initiative (and open science in general) has the goal of advancing the pace of scientific research through the use of data sharing and data methodologies (e.g., artificial intelligence). The extent to which the stakeholders in the materials research community have the knowledge and ability to embrace the habits and practices necessary for data sharing and using the datasets of others relies upon a fundamental change in culture about how we think about the practice of science. With this in mind, we surveyed researchers with a goal of answering these major research questions:

(1) How prevalent is the sharing and use of data in materials research?
(2) What are the current major impediments to FAIR data sharing?
(3) What are general attitudes with respect to the use of data in materials research? Are there differences based on field of expertise?
(4) How prevalent is the use of data-centric research approaches (such as machine learning and artificial intelligence) in materials research? Are there differences based on field of expertise?

We will report the outcomes of the survey, including any correlations between habits and opinions of researchers.

Sponsored by: NSF

Will Grout, ’23
Major: History
Hometown: West Olive, Michigan

Analyzing Animal Rights Messaging through Patrick McDonnell’s MUTTS
Faculty/Staff Sponsor: Nancy Demerdash-Fatemi

Newspaper comics in America as a form of popular entertainment are often derided as lacking deeper meaning and existing solely as a means of escapism from an ever-changing world. However, newspaper comics hold the potential to engage in a critical analysis of society and transmit these critiques to a wider audience. The comic strip MUTTS, created by American cartoonist Patrick McDonnell, critiques the notion that humans hold dominion over animals and argues for the humane treatment of non-human beings while also appealing to a wider audience. The comic continues millennia of dialogue questioning the status of animals in relation to humans while also introducing a new perspective through its focus on the effects of industrialization on the agricultural industry. Additionally, the comic’s usage of anthropomorphism centers the conversation around the emotions of the animals affected by human cruelty as opposed to the acts of cruelty themselves, asserting the sentient intelligence, agency, dignity, and autonomy of these animals.

Helmbreck

Samuel Helmbreck, ’25
Majors: Art, Environmental Science
Hometown: Albion, Michigan

Jesus Leana, ’24
Major: Environmental Studies
Hometown: Minneapolis, Minnesota

McDowell

Paige McDowell, ’24
Major: Geology
Hometown: Traverse City, Michigan

Ashlynn Reed, ’24
Majors: Environmental Studies, English
Hometown: Palmyra, Michigan

Reed

Amali Turner, ’24
Major: Environmental Science
Hometown: Tampa, Florida

Albion College Pollinator Project
Faculty/Staff Sponsor: Dr. Thom Wilch

A product of the new CSE sustainability projects course, this project was developed with the intention of promoting sustainable gardening and local pollinator populations. Pollinator gardens can serve as an educational tool and advocate for the declining populations of birds, butterflies, bees, and other insects. Garden spaces can give students, staff, and community members an area to gather, study, or relax, and they can utilize these green spaces to remedy social and academic needs. With this project, we hope to increase the biological diversity on campus and encourage the college community to spend more time outdoors. We have established collaboration between the Center for Sustainability and the Environment, the Biology and Art Departments, and Grounds and Facilities Departments. With the completion of this course, our group developed a final proposal which laid the foundation for a CSE-led initiative to create a positive space for both students and the environment on campus. As this project continues, we hope to implement the expansion of native plantings and pollinator gardens on campus and educate the college community of environmental issues surrounding them through the use of educational signage.

Sponsored by: CSE

Jesse Hepner, ’23
Major: Chemistry
Hometown: Davisburg, Michigan

Development of Metal Nanoparticle-Carbon Microsphere Composites for the Catalytic Removal of Oxyanions from Water
Faculty/Staff Sponsor: Kevin Metz

Oxyanions represent a class of emerging contaminants due to their increasing concentration in water and known negative health impacts. Perchlorate and bromate are two oxyanions that are particularly difficult to remove because of their high stability. Hydrogenation is a common approach for removal but is limited by catalyst cost. This research reports on the development of a metal nanoparticle-carbon microsphere composite that minimizes metal content, thus optimizing cost. The catalysts are made using ultrasonic spray pyrolysis (USP), producing highly porous carbon microspheres (CM) with metallic nanoparticles embedded in them. To date we have studies of palladium and a variety of bimetallic systems. Our current results will be presented.

Sponsored by: FURSCA - Robson Family Fellows Endowment

Hill

Larenz Hill, ’23
Major: Marketing Management
Hometown: Albion, Michigan

Cedriana March, ’23
Major: Marketing Management
Hometown: Albion, Michigan

March

Bridging Gaps: African American Male Higher Education and Graduation at Albion College
Faculty/Staff Sponsor: Ari McCaskill

Although many African American males are accepted to and attend college, they are still met with many barriers that limit opportunities that provide a pathway toward graduation. According to the National Center for Education Statistics, only 36% of Black male students completed a bachelor’s degree within six years. In comparison, white males graduated at a rate of 63% in six years. This stark comparison illustrates the historic and contemporary barriers to higher educational attainment for Black men. In my presentation, I will examine the socioeconomic barriers many First Generation, African American males face, before and while attending college. In a national trend, many African American first-time freshmen experience a “culture shock” once arriving at a Primarily White Institution (PWI) like Albion College. The impact of this spatial, racial, and cultural shift impacts Black males who lack a social

structure that supports and undergirds their success. Conversely, I will discuss the institutionalization of urban public education and its adverse impact on critical and analytical thinking skills needed to be successful. Localizing this national pandemic of Black-male college graduation rates, we will evaluate this phenomenon at Albion. Surveying national data reveals the systemic issue that plagues many Black male students that enroll as traditional college students. Using Maslow's Hierarchy of Needs, we will assess and compare the graduations of Black male Albion College athletes in comparison to non-athletes. Additionally, we will compare our own cohort-based experience, the Build Albion Bonner Fellows program, with a Black male student who is not part of a supportive cohort-based experience.

Hayley Jonkman, '23
Majors: Geology, Paleontology
Hometown: Lafayette, Indiana

Assessing Paleoenvironments of the Late Jurassic Ilona River Deposits, Morondava Basin, Western Madagascar
Faculty/Staff Sponsor: Madeline Marshall

This study assesses shell beds from Late Jurassic deposits in the Morondava Basin, Madagascar, using field data and thin sections to determine their modes of accumulation, stratigraphic context, and paleoenvironments in a unique, high-sediment and high-productivity setting. Shell beds are dense deposits of fossils, and the deposits addressed here, which have not previously been documented, record a key chapter in the history of the island during the time of its early isolation.

During transgressions, deep-water shales are accumulated, which are capped by iron-cemented sandstones with a diverse assemblage of invertebrate fossils, commonly damaged, and associated with glauconitic minerals. These shell beds have planar contacts and are characterized by an interval of low sediment input producing a discrete layer of cemented fossils. They are associated with major discontinuities, and interpreted as accumulating during periods of sediment omission in low-energy, moderately- to poorly-oxygenated, deeper shelf deposits.

During regressions, shell beds are associated with shallow-water, coarse-grained, carbonate-cemented sandstone dominated by oyster shells. These are thick with deeply scoured bases, and are characterized by increasing sediment input, with rare shells in surrounding beds. They are associated with minor discontinuities, and are interpreted as high-energy, well-oxygenated, nearshore deposits that recorded periodic major storms.

During intervals of flooding, with accompanying nutrient influxes, protracted exposure on the seafloor resulted in condensation, fossil fragmentation, bioturbation, and iron-cementation. During shallowing phases, increased sediment input and continued nutrient availability produced packages of shelly sandstones. Storms winnowed away sediment, concentrating shells and allowing oyster reefs to thrive until the next sediment influx.

Sponsored by: FURSCA - Semester Grant

Adia Langeland '23
Major: Geological Science
Hometown: Holland, Michigan

An Anomalous Phosphatic Shell Bed: The Monospecific and Widespread Fish Scale Marker Bed from the Permian Phosphoria Rock Complex, Idaho
Faculty/Staff Sponsor: Madeline Marshall

The Fish Scale Marker Bed (FSMB) is an anomalous shell bed within the Phosphoria Rock Complex (PRC) in Idaho. Formed during the Permian Period (~273 Ma), it is a 3-11 cm thick phosphorite bed containing high concentrations of disarticulated orbiculoid brachiopod shells, alongside fish bones, conodont elements, microborings, algae, and foraminifera. The FSMB is the only part of the PRC that displays these characteristics – Why?

To answer this question, FSMB samples from six localities were analyzed to identify and interpret characteristics that decode its formation. (1) FSMB fossils and sediments are primarily phosphatic, and the accumulation of marine phosphorites is most likely the result of elevated levels of primary productivity related to oceanic upwelling in the Phosphoria Sea. (2) The FSMB has exceptionally densely packed and fragmented shells, suggesting deposition under moderate energy conditions with post-mortem transport. (3) The FSMB is dominated by fossils with extremely rare clastic sediment resulting from the interplay of two factors: low sediment input and abundant shelly organisms. The PRC accumulated in a sediment-starved environment that was dominated by bioelemental and chemical sedimentary processes, with nutrient-rich, shallow waters, ideal for abundant orbiculoids.

Multiple lines of evidence suggest that the FSMB is anomalous within both the greater PRC and globally, due to the above interacting factors creating "Goldilocks" shell bed conditions. This research demonstrates the need for continued study of the FSMB to elucidate the complex history of this anomalous and unique shell bed.

Sponsored by: FURSCA - Semester Grant

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

Autism Representation from A-Z: Writing a Children's Picture Book to Showcase the Autistic Experience
Faculty/Staff Sponsors: Jessica Roberts, Emmeline Solomon

As an individual growing up on the Autism Spectrum, my childhood was difficult. I always knew that I was different, but I had no idea why. I always felt that these differences were a flaw in some perfect universal design and that I didn't belong in the world.

I was not diagnosed until I was in high school, which helped ease my feelings greatly. When it came time to do a Build Albion Bonner Fellows Capstone, I knew that I wanted to help make sure that other youth on the Spectrum did not feel the same as I did growing up. As a member of the Shurmur Center for Teacher Development, I knew the power

that seeing yourself represented in the material you studied had power, so I decided to use a children's book written for youth on the Spectrum by someone on the Spectrum as my medium for delivering my message.

Eryn Lewis, '23
Major: Kinesiology
Hometown: Albion, Michigan

An Analysis of Mitigating Health Risks and Outcomes from Lead Exposure Using Nutrition
Faculty Sponsors: Ari McCaskill, Carrie Walling

Lead is a naturally occurring element that has historically been used in products like paint, pipes, and gasoline. When lead is ingested or inhaled, exposure can cause adverse health effects, especially in children under the age 6. Lead absorbs into the soft tissues of the body such as the brain and nervous system. This interaction in the body can cause slowed and poor cognitive development, learning and behavioral problems, and the development of several other lifelong health issues. Blood lead level (BLL) testing is conducted to determine levels of lead exposure. Data collected by the Michigan Department of Health and Human Services has shown an increase in the lead levels of children under 6 residing in Albion, Michigan. Research has shown that nutritionally rich diets mitigate the health effects of lead exposure. This study examines the importance of accessible produce in a designated food apartheid. More importantly, it examines why a nutritional prescription program would be advantageous in mitigating the health effects of lead exposure and poor food accessibility.

Brian Lomeli Garcia, '23
Major: Biology
Hometown: Inglewood, California

Genetic Diversity of Aphid 'Superclone'
Faculty/Staff Sponsor: Abigail Cahill

Aphis nerii, also known as oleander aphids, are expected to have low genetic diversity due to the female aphids being able to clone themselves. Despite this life history, A. nerii is a successful invasive species on milkweed plants in North America. To see if A. nerii has low genetic diversity within its introduced range, we compared the COI barcode sequences from populations within the United States (in Georgia, Illinois, Michigan, Ohio, and Pennsylvania, collected over multiple years). I sequenced over forty A. nerii individuals from seven populations, and analyzed haplotype diversity and genetic diversity in both space and time. My results showed low genetic diversity in both space and time, consistent with the clonal life history of A. nerii, and a phylogenetic tree showed low clustering based on geography. Genetic distance between sites did not relate to physical distance between sites. I also found a relatively high rate of parasitism of the aphids by the wasp Lysiphlebus testaceipes. Though parasitism was not found equally in all populations, there does seem to be a correlation with the Michigan population having an increase of parasitism. My data allowed us to explore Aphis nerii and their reproductive system to further understand their clonal life cycle and its impacts on their ecology and dispersal.

Sponsored by: FURSCA - Robson Family Fellows Endowment

Deludet

Justin Loukotka, '23
Major: Environmental Science
Hometown: Ann Arbor, Michigan

Haley Marion, '23
Major: Environmental Science
Hometown: Chesterfield, Michigan

Marion

Delia Nieves, '24
Major: Environmental Studies
Hometown: Cleveland, Ohio

Alaina Shepardson, '25
Major: Environmental Science
Hometown: Jackson, Michigan

Nieves

Uma Shuford Williams, '24
Major: Environmental Studies
Hometown: Chicago, Illinois

Shepardson

Albion CSE Thrift Project
Faculty/Staff Sponsor: Thomas Wilch

Williams

The overconsumption of textiles is leading to an environmental disaster. Fashion workers are facing union restrictions, higher rates of cancer and miscarriages, pollutants of polyester microplastics, toxic waste, insecticides, and abusive child labor. Modern "fast fashion" culture has increased clothing production by 400% in the last 20 years. Now the average garment is only worn 7 times before being thrown away. Clothing consumption has created significant environmental and human rights issues within local communities and on a greater, global level. Our team of students in the fall Sustainability Projects class through the Center for Sustainability and the Environment were tasked with designing a project surrounding these global issues with the goal of improving the quality of sustainability and wellness of our community.

To combat these issues, our team put together the Albion Thrift Fair Project, where students and faculty members donated gently used clothes and purchased from the event, contributing to sustainable consumption practices. As we worked on this project, we learned how to promote sustainable consumption practices. After our first sale we made over $1,000 that we are donating into a new green fund that will help financially support student-led environmental projects on campus. Our goal was to create a new annual campus event that can educate students and staff about the importance of sustainable consumption and help address this issue, while creating a fund to help fund student-led sustainability projects. Looking into the future, we hope to hold this event again.

Sponsored by: CSE

Leoné Macharia, ’26
Major: Economics (emphasis in Human Resources)
Hometown: Nairobi, Kenya

Exposing Biases Held Against Transgender Individuals
Faculty/Staff Sponsor: Andrew Christopher

Transphobia refers to the fear, hatred, or prejudice towards individuals who identify as transgender or non-binary, or who do not conform to traditional gender norms and expectations. The World Health Organization estimated the prevalence of transgender individuals worldwide is around 0.5-1%. More than 1,000 documented transgender and gender non-conforming people have been murdered since 2016. High death rates of transgender individuals continue to rise as a result of societal and cultural beliefs that gender identity and expression should align with the sex assigned at birth. Transphobia is often rooted in misinformation, stereotypes, and a lack of understanding about the transgender community. It is a form of discrimination that has serious consequences for those who experience it. There is no intervention to curb transphobia, and rarely is there media coverage around these deaths. My research aims to help shed light on the bias that is held against Transgender individuals. It highlights the often-subtle ways that they encounter mistreatment in everyday aspects of their life, whether being in the workplace or in interpersonal relationships. It will take an intersectionality perspective and articulate what it means to, specifically, be a black transgender person in the 21st century. In addition, this presentation will provide resources that audience members can consult to learn more about the transgender community, and how to be an ally to it. Audience members will learn how everyone can support trans individuals and reduce the prejudice and discrimination, both subtle and overt, that these people endure.

Martinez

Alyvia Martinez, ’24
Majors: Biology, Mathematics
Hometown: Waterford, Michigan

Breh Ruger, ’23
Majors: Biology, History
Hometown: Battle Creek, Michigan

Ruger

Investigating the Euchromatic Reference Region of the Muller D Element in Drosophila kikkawai
Faculty Sponsor: Ken Saville

Our project, partnered with the Genomics Education Partnership (GEP), involves the careful annotation and comparative analysis of the Muller D element, a euchromatic reference region, in different species of Drosophila. In our model organism D. melanogaster, the D element corresponds to the 3rd chromosome. The goal of this project is to observe and compare the changes that have occurred in these sequences throughout evolution. These changes impact the function of the organism and can aid future efforts in understanding how evolution may impact the species and its genome. Within our bioinformatics course, we used online tools to annotate 31,000 base pairs of contiguous sequences from the subspecies genome of D. kikkawai. To annotate this sequence, we used the genomic region from D. melanogaster as a reference to begin a comparative analysis. Using the UCSC Genome Browser, FlyBase, BLAST, and the Gene Record Finder, we estimated the positions of the exons, start codons, stop codons, donor sites, and acceptor sites for each isoform provided. Our analysis has resulted in one distinct gene; however, more distinct genes may reveal themselves as we work toward the final results.

Luke Mavis, ’23
Major: Economics
Hometown: Rhodes, Michigan

The Impact of International COVID-19 Travel Policy on Real Gross Domestic Product
Faculty/Staff Sponsors: Jon Hooks, Zhen Li, Dawid Tatarczyk

The COVID-19 pandemic’s short and long-term impacts are yet to be fully understood, with the breadth of its effect requiring ongoing and still uninitiated studies from various disciplines. The COVID-19 pandemic is an international and historical trigger event, rapidly accelerating long-standing political and economic crises toward a breaking point. Each pandemic’s economic impacts relate like links in a chain, materializing increasingly calamitous iterations of the same underlying problems with each additional chainlink. May these links arise in the form of historical inflation, projected economic recession, commercial infrastructure breakdown, or rampant financial speculation; they are united in their ties to foundational contradictions in the capitalist economic system and their acceleration under the impacts of the ongoing COVID-19 pandemic.

This study focuses its attention on the macro level in examining the impact of COVID-19-related travel policies on the growth of real gross domestic product (GDP) across OECD member countries between 2015 and 2021. Analysis of real GDP allows this study to bypass the obscurities of heightened inflation, especially relevant for data from 2021, representing the economic developments while providing a picture of total economic growth and performance across the globe. The conclusions of this study hope to provide insight into the impacts of the past and, in some cases, ongoing measures against the COVID-19 pandemic and possible alternatives.

Megan McCulloch, ’23
Major: Psychology
Hometown: Fort Gratiot, Michigan

Student Personality and Teacher Behavior Preferences
Faculty/Staff Sponsors: Andrew Christopher, Eric Hill, Shanti Madhavan-Brown

Prior research has suggested that there are relationships between students’ personalities as measured by the Big Five and preferences for the personalities of their teachers. For instance, extraverted students tended to prefer teachers who were also highly extraverted. Likewise, students high in both openness to experience and conscientiousness tended to prefer teachers who themselves are conscientious. Buskist et al. determined 28 qualities of a “master teacher” at the college and university level. Subsequent research consistently found that among the 28 qualities, there are

two overarching dimensions of desired teacher behaviors: (1) professional competency (e.g., effective communicator) and (2) caring/support (e.g., sensitive and persistent). The current study sought to further investigate how students' personalities predict their preference for teachers who display professional competence and teachers who display caring and supportive behaviors.

Data were collected from 4 schools: Albion College, Kalamazoo College, Lyon College, and University of Wisconsin-LaCrosse. With respect to teacher professional competency, students who were high in extraversion and conscientiousness preferred such teachers compared with their peers who were low on these two personality traits. However, students high in openness expressed less enthusiasm for such teachers than students low in openness. With respect to teacher caring and supportiveness, students high in neuroticism, extraversion, and conscientiousness had a greater preference for such teachers compared to their peers low on these personality traits. Further analyses and the theoretical and practical implications of these findings will be discussed.

Megan McCulloch, '23
Major: Psychology
Hometown: Fort Gratiot, Michigan

Anxiety and Obsessive Compulsive Disorder (OCD) in Individuals With CHARGE Syndrome
Faculty/Staff Sponsor: Shanti Madhavan-Brown

CHARGE syndrome is a rare congenital disorder that can cause multiple physical, cognitive, behavioral, and sensory impairments. The majority of CHARGE cases have been shown to be caused by a mutation in the CHD7 gene. CHARGE is an acronym for some of the most common symptoms: C - colomba of the eye (i.e., missing part of iris and/or retina); H - heart defects; A - atresia/stenosis of the choanae (i.e., bony or membranous blockage/ narrowing of the nasal passage); R- restriction of growth and/or development; G - genitourinary anomalies; E - ear anomalies and/or deafness. CHARGE syndrome is also the leading cause of congenital deafblindness.

Due to the multisensory impairments, individuals with CHARGE syndrome face a variety of daily challenges including anxiety and/or anxious behaviors; this has been a growing concern amongst the CHARGE community. This presentation will include a synthesis of two studies conducted within the CHARGE Syndrome community. Results will be provided regarding the anxiety of children and adults with CHARGE Syndrome, common anxious behavior, and prevalent anxiety diagnoses and disorders. Additionally, connections between typical factors of anxiety and frequent experiences in CHARGE Syndrome (e.g., pain, lack of sleep, sensory impairments) will be discussed. We will also review comparisons of these results to other research on anxiety among genetic disorders and future directions for research.

Paige McDowell, '24
Major: Geology
Hometown: Traverse City, Michigan

Chemical Heterogeneity in Phengite from the Ultrahigh-Pressure Gneiss, Tso Morari Terrane, India
Faculty/Staff Sponsor: 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 were 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 gneiss samples collected along a 10m traverse, we look at the mineral chemistry and trace element concentration of mica grains from each rock, as well as the heterogeneity within individual grains displaying varying amounts of preservation and recrystallization. When we consider the Si and FeT/Mg values as markers of pressure and temperature respectively, we see we have grains that grew both at near-peak conditions and during exhumation.

Sponsored by: FURSCA, NSF, Taylor Fund

Lily Miller, '23
Majors: Psychology, German
Hometown: Jackson, Michigan

Autism Spectrum Disorder, Applied Behavior Analysis, and Well-Being
Faculty/Staff Sponsors: Eric Hill, Shanti Madhavan-Brown, Perry Myers

Autism Spectrum Disorder (ASD) is a developmental disability that can cause social, communication, sensory, and behavioral challenges. Applied Behavior Analysis (ABA) is the science in which the analysis of behavior is applied to improve socially significant behavior and to identify the purpose responsible for a specific behavior. ABA has been used as a treatment to reduce dangerous or socially insignificant behaviors primarily in children with ASD. Evidence has also shown that ABA can increase social, academic, daily living skills, and language domains. However, there has been outcry in the ASD community that ABA can cause individuals trauma such as PTSD, anxiety, depression, compliance issues, and low well-being. There are many definitions of well-being, the focus in this study is specifically on the mental illness and mental health aspects of the population. The purpose of this study is to examine how ABA affects the well-being of these individuals and their overall perspectives of the therapy by looking at posts from Reddit. Positive and negative tones were analyzed from 83 posts from the two subreddits, r/AutisticAdults and r/AdultAutism, by using Language Inquiry and Word Count (LIWC). LIWC is a text analysis program that calculates the percentage of words in a text that will fall into one or more of over 80 psychological categories. By doing this research, we hope to gain a better understanding of the perspectives of adults with ASD. This could be used to develop programs

aimed at improving the well-being of those in the ASD population and providing effective ways to support their needs without imposing harm.

Jared Nash, '23
Majors: Physics, Mathematics
Hometown: Escanaba, Michigan

The Anti-Reflective Properties of Subwavelength Structures on Alumina Lenses
Faculty/Staff Sponsor: Nicolle Zellner

The Cosmic Microwave Background Radiation (CMBR) is the oldest detectable light in our universe, imprinted on the sky when the Universe was just 380,000 years old. Produced during the creation of the universe, a fraction of this radiation is slightly polarized. The study of this polarization gives insight into the distribution of energy and matter in the early universe. To study this polarization with precision, astronomers need sensitive equipment which allows the maximum amount of light to be collected during observation. As a result, numerous anti-reflective coating techniques have been developed, including laser ablated subwavelength structures (SWS). This presentation will include the process for simulating the transmission of light through subwavelength structures on alumina lenses.

Sponsored by: NSF

Lucy Nevrly, '23
Majors: English
Hometown: Downers Grove, Illinois

Telling and Listening: Successful Storytelling According to William Faulkner
Faculty Sponsors: Jess Roberts

Writing during the first half of the twentieth century, William Faulkner is best known for his modernist novels about the American South. Faulkner's major works are set in the fictional Mississippi county of Yoknapatawpha and feature a recurring cast of characters. In several of his novels, Faulkner explores the complicated exchange involved in storytelling and examines what is required from both the listener and the teller in order for that exchange to be successful. In his 1931 novel Sanctuary, two women tell stories of the abuse they have experienced from men throughout their lives. In Absalom, Absalom! published in 1936, a young man hears a story about the destruction of a family in his community from several different sources, later retelling it himself. In both of these novels, an important condition for successful storytelling is an absence of interruption by the listener. For Faulkner, successful storytelling is represented by the listener's ability to internalize the details of the story and integrate its meaning into their own thinking. By using his characters to portray the behaviors of both successful and unsuccessful listeners, Faulkner creates a model for his readers, listeners themselves, to replicate when presented with the stories found in his novels.

Sponsored by: FURSCA - Hyde Fellows in Student Research

Newman

Miles Newman, '25
Major: Biology, Communications Studies
Hometown: Rolesville, North Carolina

Adrian Sanchez, '26
Major: Environmental Science, International Studies
Hometown: Dallas, Texas

Methods for Motoring Invertebrates in the Rice Beds
Faculty/Staff Sponsor: Abigail Cahill

This project studies the macroinvertebrate biodiversity in the Kalamazoo River. The 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. Understanding this research will help to further our understanding of how much biodiversity lives within this patchy and seasonal habitat. Invertebrate collectors made from Tupperware containers were placed in different spots in the Kalamazoo River in August 2021. These sites were inside and outside the wild rice beds. After two weeks, they were removed and the samples taken were preserved in ethanol. Collectors were also made from birch bark and biodegradable materials, and used to collect samples from the same locations in February 2022. We sifted through the samples using a microscope and dichotomous key and counted how many of each species of invertebrate were found. We compared abundance, community composition, and diversity inside and outside the rice bed and compared data across seasons. We also compared differences in diversity and abundance based on collector materials.

Sponsored by: Scholarship Assistant Program

Claire Nickerson, '23
Major: Finance
Hometown: Battle Creek, Michigan

Green vs. Green: Comparing Environmental and Financial Practices of Athleisure Companies
Faculty/Staff Sponsor: Vicki Baker

Companies are held to the standard of conducting business with regard to profits, people, and the planet. There are companies that choose to focus more on people and profits. However, with the increasing concern for our environment, companies are beginning to focus on the planet and letting people and profits follow. Girlfriend Collective is an athleisure brand with the sole purpose of serving the environment with the production of its products. Along with the planet, they serve the community and are a thriving business. Lululemon falls short in terms of preserving the environment through its production process, yet they are extremely profitable and serve its shareholders well. Businesses have the ability to operate keeping profits, people, and the planet at the forefront.

Madisyn O'Dell, '23
Major: Biology
Hometown: Albion, MI

Creating a Comprehensive List of Options to Receive Sustainable, Proper Preventative Oral Care
Faculty/Staff Sponsors: Maggie Godfrey, Ari McCaskill

A lack of dental services in Albion are affecting low income children and their access to quality dental care. Studies have shown that the 49224 zip code (Albion) has 17.25% of families living below the poverty level. Children in these families below poverty level are less likely to have access to dental services and care, as it may be hard to afford the preventative dental care that they need.

Unstable employment, falling wages, and rising costs in medical treatments in recent years have led these low income families and children to enroll in Medicaid, which not all dentists accept. When they do, wait times for available appointments prevent many families from obtaining preventative dental care. This delay leads to other serious health-related consequences, which eventually force parents to make decisions to access dental care outside of their community.

The lack of access for children of low-income families leads to poor, often life-long oral health outcomes and eventually overall general health outcomes if not taken care of; with plans to become a pediatric dentist after undergrad, realizing that my circumstances growing up were different from others motivated me to find ways to make dental care accessible to all.

In this presentation, I hope to improve the ways Albion families locate and become educated on dental care and create a document that can be distributed throughout the community about options available to receive sustainable, proper preventative dental treatment and oral care.

Mauricio Perez Garcia, '23
Major: Political Science
Hometown: Dallas, Texas

Resilience by Means of Compliance: A Critical Examination of Borderlands/La Frontera's "New Mestiza" Identity
Faculty/Staff Sponsor: Elizabeth Barrios

This project critically examines Gloria Anzaldúa's Borderlands/La Frontera (1987) and its development of counter-identity, the "new mestiza." Grappling with the contradictory nature of the U.S.-Mexico borderlands, the "new mestiza" embodies the Chicane's (Mexican-American) experience, navigating U.S. imposed racial binaries. This is done by conducting a comparative analysis between Borderlands/La Frontera and José Vasconcelos's essay, La raza cósmica (1925). Borderlands/La Frontera incorporates an ethnic and racial heritage that is grounded in mestizaje and, especially, invokes Vaconcelos's theories of racial mixing—mestizaje. Vasconcelos sought to challenge Anglo-Saxon racial structures, which operate within principles of white purity, by developing notions of race grounded in the Spanish colonial structure of mestizaje. Although this structure allowed for racial hybridity and malleability, it also maintained a racial hierarchy. The essay became influential in 20th-century Mexican politics. This project argues that by embracing racial theories of mestizaje, Borderlands/La Frontera, and La raza cósmica ultimately conform to the very racial ideologies they aim to critique. Of particular interest to this project is the way in which these texts depict Mexico as a site through which to conceptualize their ethnic and racial consciousness.

Sponsored by: FURSCA - Hyde Fellows in Student Research

Kaylee Peterson, '23
Major: Biology
Hometown: Novi, Michigan

Flowers from "Hadestown": A Comparison of the Greek Myths of Orpheus and Eurydice, and Hades and Persephone, in an Award-Winning Musical
Faculty/Staff Sponsors: Maureen Balke, Nicholas Laban

The story of Eurydice and Hades in Flowers is contrary to the classic Greek myth. The differences found in the song, and the plot of the award-winning musical "Hadestown", are quite drastic. The writer for the show, Anaïs Mitchell, provides a different telling of the same story in her musical. How does this modern adaptation of an original myth lose some of its original intentionality? Or is it richer and more easily digestible to a widespread audience? Listen to Flowers and dissect the historical framework of Orpheus, Eurydice, Hades and Persephone to find out.

Megan Piontkowsky, '23
Majors: Physics, Mathematics
Hometown: Grand Rapids, Michigan

The Future of Albion College Astronomy
Faculty/Staff Sponsor: Nicolle Zellner

Albion College has a deep-rooted history in Astronomy dating back to 1883. The most recent addition to the college's collection of telescopes occurred in 2007 when Bill and Lois Stellman donated a 14 inch Celestron Telescope to the school. This telescope has substantial research potential. However, numerous technical issues and installation errors have caused this scope to lay practically dormant for 15 years. Updates to this telescope include a new dome operating system, a fully computerized mount, an impressive camera for astrophotography and numerous software systems to remotely run the telescope. With the help of two brilliant mechanics, Jeff Thrush and Clay Kessler, the future of Albion College astronomy is here.

I have spent the last nine months learning how to operate all of the telescopes on campus. I began this project over the summer, when I learned to operate the 10 inch Meade telescopes and started performing astronomical observations. At the end of the summer I traveled to Mount Wilson Observatory in California and gained a wide-spread knowledge in collecting astronomical data and conducting astrophysics research. This semester I have been working alongside the telescope mechanics to update the newest telescope and receiving training on operating it. This

presentation will highlight my personal development in observational astronomy and the new potential of astronomy for future students at Albion College.

Through these experiences I have become proficient in the use of our equipment and I hope to spread my skills so that more of the Albion community has the opportunity to experience the most advanced astronomy the campus has to offer.

Cassidy Porter, '23
Major: Business
Hometown: Albion, Michigan

#OurAlbion
Faculty/Staff Sponsors: Ashley Feagin, Ari McCaskill, Emmeline Solomon

Albion has a rich network of people who are unnoticed but make up the backbone of the community. Through this work, I interviewed women of Albion to better understand the relationship between their personal stories and their connection to the Albion community. The women portrayed in this series of photographs are the lattice that holds the community together, and their stories enrich the work they do for this community. I interviewed a diverse group of women with different experiences that communicate the overlapping story of the Albion community. The outcome of the interviews highlight the positivity and love people have for the town. It has captured important landmarks within our community while highlighting a few of the countless key contributors to the making of Albion. The work culminates in photographs of the women and locations, along with quotes from the interviews. This will be displayed in an exhibition in the old bank building downtown beginning April 14th, 2023.

Sponsored by: BABF

Elizabeth Powell, '23
Majors: Combined Engineering and Physics
Hometown: Beal City, Michigan

Experimentation for Art, Not Animals
Faculty/Staff Sponsor: Emmeline Solomon

My piece is based on the idea of bringing science and art together, specifically chemistry and sculpture. I've sculpted a tested-on rabbit out of clay, molded with urethane rubber and plaster, and then cast in cement. Complementing that will be a syringe made out of glass, which will be hung above the rabbit when installed. I will also be creating the main components, such as cement and dye, on a smaller scale and using the lab reports in my paper.

Sponsored by: FURSCA - Semester Grant

Austin Raymond, '23
Major: Biology
Hometown: Clare, Michigan

Investigating DNA Repair Following Excision of the Hobo Transposable Element in Drosophila melanogaster
Faculty/Staff Sponsor: Ken Saville

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. These breaks need to be repaired in order for the cell to survive. Previous studies have shown hobo excision and repair to resemble V(D)J recombination, an important mechanism for generating antibody diversity in animal immune systems, including humans. In this study, I studied a TE called hobo in Drosophila melanogaster. The specific hobo element is called "Hop8" and is located on the X-chromosome. However, the exact location of Hop8 is unknown. The goal of this project was to first, locate the precise location of Hop8 through the use of a technique called inverse PCR. Once the location was determined, genetic crosses were used to make Hop8 jump out of its original location. Standard PCR was then used to amplify and sequence the excision sites. The nature of these sequences can be used to determine the mechanism of DNA repair used to repair the excision site. The goal of this study is to get a better understanding of transposable elements and DNA repair and how vital they are to living things. The results from inverse PCR suggested where hobo was, but it turned out to be in a repeated sequence that had similar copies throughout the genome. After further sequencing, it was also discovered that HoP8 was located in the centromere of the X-chromosome. With the location of Hop8 known, further transposition experiments were carried out to investigate the hobo excision and repair mechanism in more detail.

Ashlynn Reed, '24
Majors: English, Environmental Studies
Hometown: Palmyra, Michigan

Exploring Food Stories in Albion, MI
Faculty/Staff Sponsor: Trisha Franzen

As food studies continue to gain more recognition as a driving force in environmental, racial, and gender justice, Albion, Michigan's food history can provide a local representation of these issues. A culturally rich but historically food-insecure area, Albion has persevered through significant historical and social injustice and change. Still today, many of its residents struggle with obtaining and enjoying healthy, fresh produce.

In partnership with the Albion Community Garden, I have conducted a preliminary study regarding Albion's food history. This extensive gathering of literature and information about the Albion community has uncovered shared histories regarding culture and the generational gaps that follow injustice. By analyzing existing church and community cookbooks in Albion this semester, I have created the foundation for a new Albion Community Cookbook. This semester, I have completed the preparations for this project and the collection for the

cookbook will continue this summer. I will be collecting recipes, food-related stories, and related cultural history through interviews. With my current study and the continuation of this research, I hope to bring awareness to how culturally and personally relevant food experiences create a sense of community and belonging in Albion, a diverse community with a rich history of gardening and food.

Luke Rivard, '24
Major: Music Performance
Hometown: Wilson, Michigan

The Compositional Techniques of Irish Traditional Music
Faculty/Staff Sponsor: Matthew Kay

In any type of music, there are identifying characteristics that help to define it. Irish Traditional Music (ITM) is a genre that is diverse in the types of music that constitute it. Each type of dance tune or song/air has idiomatic characteristics as well as traits that are shared between themselves and with music that is seemingly unrelated. Many factors constitute what makes an "Irish sound" like the intervals between note groups, tonality, instrumentation, and meters. It was my goal to create a handbook for composers to be able to write in an Irish style by an examination of idioms found in the most famous pieces of a wide variety of subgenres.

Sponsored by: FURSCA - Hyde Fellows in Student Research

Roberts

Kylie Roberts, '24
Major: Biology
Hometown: Vandalia, Michigan

Sarah Stovall, '24
Major: Biology, Communication
Hometown: Grosse Pointe, Michigan

Stovall

Michaley Vieau, '23
Major: Biology
Hometown: Michigan Center, Michigan

It Takes Three to Tango: Similarities of the Tango Gene in Multiple Drosophila Species
Faculty/Staff Sponsor: Ken Saville

Vieau

This project is a part of the pathway project sponsored by the GEP (Genomic Education Partnership). Biological systems are networks consisting of genes, proteins, and metabolites that are connected through different enzymatic/chemical reactions and transcription regulation.
The properties of these networks can be measured using a mathematical approach to make predictions about the evolution of a system based on those properties. We will annotate genes found in the Insulin signaling pathway, which is highly conserved in different species of flies. The Insulin pathway is critical in growth and metabolic homeostasis. The GEP sponsors these projects and students select genes within the projects to work on. Our group chose to select the Tango gene (coded tgo) in four different fly species. We will be finding the locationsof all the genes and comparing the sequences that are found in the four different species; D. hydei, D. obscura, D. simulans, and D. takahashii. The tango gene is important during oxygen deprivation within tissues and tissue responses.

Ashley Rocha, '23
Major: Music, Sociology
Hometown: Dallas, TX

Puccini's Aria "*La Canzone di Doretta*" from the Opera "Il Rondine"— New Love Awakened in a Kiss!
Faculty/Staff Sponsor: Dr. Maureen Balke

Giacomo Puccini was a successful Italian composer who dedicated his life to music because it was a family profession. After witnessing a performance of Verdi's Aida Puccini knew that opera was his true passion. His operas are what he is most known for today and now is often compared to Verdi as the most important Italian composers of all time. Puccini's operas are among the most frequently performed and best-loved operas in the entire repertoire and include *La Bohème, Tosca* and *Madam Butterfly* (Madama Butterfly). *La Rondine* tells the story of Magda, a Parisian courtesan who falls in love after spending a night with Ruggero, the son of a childhood friend. Both completely in love start to plan their lives together, move to a villa in the riviera and talk about marriage. However, once the marriage was approved by Ruggero's mother Magda seemed to be shoved back into reality where she couldn't allow herself to ruin Ruggero's future due to her deplorable past and returns to be with Rambaldo, a rich banker. In this song from the first act of the opera Magda improvises a story of a character named Doretta who fell hopelessly in love with a student, based on an old flame Magda once had.

Breh Ruger, '23
Majors: Biology, History
Hometown: Battle Creek, Michigan

Distance from Prairie Strips and Cropping System Management as Effects on Natural Pest Suppression
Faculty/Staff Sponsor: Abigail Cahill

Predatory and parasitic arthropods provide valuable pest suppression services to agriculture. However, the expanding footprint and increasing intensity of agronomic systems have decreased both abundance and diversity of service-providing arthropods. Agricultural modifications such as the inclusion of prairie strips (PS) can be implemented to alter landscapes and include habitats for predatory arthropods. I used plasticine sentinel caterpillar mimics, which record predation imprints, to ask if pest suppression services 'spill over' from PS into crop fields, and at what scale. Plasticine caterpillars went in two types of wheat cropping systems at the Kellogg Biological Station LTER Main Cropping System Experiment; 'reduced input' (emulates conventional practices but with reduced fertilizer and pesticide use), and 'biologically based' (lacks external inputs). Caterpillars were placed within PS and at 1, 5, and 20m into the field as well as the lawn outside the field. Attack marks on caterpillars were evaluated as rodents, birds, or arthropods. Rodent attacks were most frequent in all treatments and distances. There was no significant evidence that mean attack rates were any higher within or near the PS, as opposed to further into the field,

during the summer growing season. Arthropod attack rates were higher in July than in June and were low overall. This research did not indicate a 'spillover' of pest suppression services from the prairie strip landscape modification.

Sponsored by: NSF

Sondra Sewell, '23
Major: English
Hometown: Albion, Michigan

Annexation, Immigration, and Acculturation: How to Foster a Sense of Belonging in Students Who Attend School Outside Their Home Communities
Faculty/Staff Sponsor: Suellyn Henke

In May of 2016, Albion residents voted to annex their school district to neighboring Marshall. This decision was motivated by financial necessity; Albion Public Schools had accumulated significant debt, and enrollment rates were steadily declining. Albion was then, and still is, comprised largely of people from historically marginalized populations. The student body of Albion Public Schools was majority Black and low-income. Marshall, however, has a majority white and middle-class population.

About thirty miles southwest of Albion, over two-thousand Yemeni people live in Coldwater, some of whom are first-generation immigrants seeking refuge from the humanitarian crisis occurring in their home country. Many of the Yemeni youth attend Coldwater Community Schools, where they experience school in the United States for the first time. They come from an Arabic-speaking, Muslim country to a majority English-speaking, white, and Christian town in rural Michigan. They face pressure to learn an entirely new language and adapt to an entirely new culture.

Through Albion College's Teacher Education Program, I was granted the opportunity to complete clinical experiences in both Marshall Public Schools and Coldwater Community Schools. My time in these two school districts was spent contemplating one central question: how can I, as an educator, foster a sense of belonging in students who attend school outside their home communities? My project is solution-oriented; I will examine possible ways for educators to help their students simultaneously feel both a sense of belonging and a sense of security to retain their own identities—a process known as acculturation.

Shepardson

Alaina Shepardson, '25
Major: Environmental Science
Hometown: Jackson, Michigan

Swope

Ikatari Swope, '25
Major: Biology
Hometown: Clinton Township, Michigan

Aphids Effect on Milkweed Seed Production and Their Genetic Diversity
Faculty/Staff Sponsor: Abigail Cahill

The species that has been the basis of our study is an introduced aphid species, Aphis nerii. Our research asked how these aphids affect the production of milkweed seeds and the genetics that correspond with the species. Many gardening articles and blogs claim these aphids cause damage to the plants, but there is little data. We introduced aphids to milkweed plants and observed them over the course of a 3 month period. We collected the seed pods from plants with and without aphids and analyzed whether aphids affected their seed production. We also studied genetic diversity amongst aphid populations in the eastern United States. Aphids reproduce asexually, causing them to have low genetic diversity. We used DNA extraction, PCR, and gel electrophoresis to study the genetic diversity in these populations.

We hope to shed some light onto how much of an effect, if any, the aphids have on milkweed populations. By conducting these experiments, we were able to gain a more complex knowledge about this invertebrate species and, in turn, open a door to future research that can help us identify how aphids affect and respond to their environments.

Sponsored by: Biology Department, Faculty Development Funds, SAP, Scholarship Assistant Program

Bach Tran, '23
Major: Biology
Hometown: Hanoi, Vietnam

Predicting Head and Neck Cancers treatment response from MRI-LINAC Images Using Artificial Neural Networks
Faculty/Staff Sponsor: Abigail Cahill

Head and Neck (H&N) cancers are within the surfaces of the head and neck, including the oral cavity, throat, voicebox, nasal cavity, and salivary glands. H&N cancers are commonly treated with radiotherapy, and the treatment efficacy highly depends on treatment planning and modification based on treatment response. I propose a novel deep-learning approach to predict H&N cancer treatment response from Magnetic Resonance Imaging (MRI) Images. I constructed two neural networks, including the U-net Convolutional Neural Network (U-net CNN) and Convolutional Long Short-Term Memory (ConvLSTM) network, to predict the tumor shrinkage, shape, and size at the end of radiotherapy treatment from the MRI scans of patients from the first three weeks of treatment. My models were trained with a dataset of 27 H&N cancer patients receiving radiotherapy, and their predictive accuracy was assessed with a Dice-Sorensen coefficient of 77% (U-net CNN) and 74% (ConvLSTM) and Jaccard index of 64% (U-net CNN) and 59% (ConvLSTM). Given the same dataset, my trained deep learning models can perform with the accuracies of no significant differences ($p = 1.00$). My models are essential in clinics because they can aid physicians in creating radiotherapy treatment plans to reduce the dose to radio-sensitive organs at risk and increase the treatment efficacy. Accurate models also have the potential to be used in smaller clinics without installing costly real-time screening machines.

Tran

Bach Tran, ’23
Major: Biology
Hometown: Hanoi, Vietnam

Dylan Ranshaw, ’23
Major: Biology
Hometown: Eaton Rapids

Ranshaw

Annotating Lnk and Chico Genes Within the Insulin/Insulin-Like Growth Factor Signaling (IIS) Pathway Across the Drosophila Genus
Faculty/Staff Sponsor: Ken Saville

Insulin/insulin-like growth factor signaling (IIS) is one of the major metabolic pathways involved in growth control and homeostasis. One of the main intracellular components of IIS in Drosophila is Chico. After the Insulin-like receptor (InR) is activated, the adaptor protein Lnk facilitates the InR - chico interaction, which activates the downstream components and promotes the IIS pathway. This pathway is well-conserved across multicellular organisms, including fruit flies and humans, so understanding the evolution and function of the pathway would allow us to develop therapeutic strategies for metabolic syndromes. In this study, we focused on annotating the IIS pathway’s core components, Lnk and Chico, in fruit fly species D. elegans and D. eugracilis to analyze how these genes evolve across the Drosophila genus. This process involves using several web-based tools with the D. melanogaster as a model for our two targeted genes to compare the variations in D.elegans and D.gracilis. We approximated each exon’s location using BLAST, then we precisely localized start codons, donor and acceptor splice sites, and stop codons for each isoform using a variety of evidence tracks, including RNA-sequencing, gene predictors, and short matches from the UCSC genome browser. Finally, these results will be verified with the gene model checker and be combined with data from the Genomics Education Partnership (GEP), a nationwide scientific community for undergraduate biology education with various comparative genomics projects, to gain insights into the structure and operation of the Insulin pathway in various Drosophila species.

Trang Ha Tran, ’25
Majors: Integrated Marketing Communications, Mathematics
Hometown: Hanoi, Vietnam

Social Media Marketing Improvement in Albion College Facility - Whitehouse Nature Center
Faculty/Staff Sponsor: Katey Price

Throughout the years, the Whitehouse Nature Center (WNC) has been a major resource for Albion College students, faculty, and community, yet public awareness and knowledge were still falling short of its true potential. Utilizing the rapid growth and familiarity of social media as well as marketing’s constant improvement through these outlets, the proposed marketing campaign for this project aims to provide the wider Albion community with useful information about WNC. The aim is to increase positive outcomes for all involved: increased knowledge, use of, and engagement with the WNC (community & WNC positives), as well as learning and skill cultivation in the field of marketing and social science research for the student researcher.

Sponsored by: FURSCA - Hyde Fellows in Student Research

Hunter Williams, ’23
Major: Exercise Science
Hometown: South Lyon, Michigan

Assessment of Nutritional Knowledge in Division III Collegiate Athletes
Faculty/Staff Sponsors: Heather Betz, Julie Cousins, Meghan Webb

Nutritional knowledge is an essential component leading to quality performance, health, and wellness among athletes. Purpose: To assess the nutritional knowledge of Division III college athletes. Methods: 234 athletes (n = 131 male, n = 102 female, n = 1 prefer not to say) from 15 varsity teams completed the sport nutrition assessment of knowledge (SNAK) screener. The SNAK consists of 22 individual questions and seven dimensions of nutritional knowledge. Results: In the total sample, the accuracy on the individual items ranged from 17.1%-99.1%, with the average accuracy of 74.5%. When examined by dimensions of knowledge, the total sample ranged from a low of 6.4% (protein) to a high of 93.6% (energy availability). When analyzed by major or whether they had completed a nutrition course, the average accuracy on the individual items was 79.6% vs 73.6% (Kinesiology vs. non-Kinesiology majors), 77.3% vs 72.7% (Science vs. non-Science majors), and 77.2% vs 74.1% (nutrition course completed vs. not completed). When examined by dimensions of knowledge, Kinesiology majors scored significantly higher than non-Kinesiology majors on supplements (62.2% vs 43.1%, $p<0.05$), as did those who had taken a previous nutrition course (63.9% vs 42.9%, $p<0.05$). Science majors scored significantly higher than non-Science majors regarding dietary fat (71.3% vs 50.7%, $p<0.05$). Conclusions: There were significant differences in the nutritional knowledge in this sample of Division III athletes. These results highlight the need for comprehensive nutritional education, especially for Division III athletes.

Marshall Wood, ’23
Majors: Biology, History
Hometown: Bay City, Michigan

Determining Efficiency of Alcohol Fermentation Process under Anaerobic Conditions Using Different Organic Substrates and Assessing Their Antimicrobial Potentials
Faculty/Staff Sponsor: Ola Olapade

The efficiency of alcohol production and the antimicrobial properties of different substrates were investigated in this study. Three substrates were examined: grape, malt, and sorghum. The grape extract was found to have the fastest conversion to alcohol, with an average 4-day complete conversion. In contrast, the malt and sorghum environments never saw a full and complete conversion. None of the substrates displayed antimicrobial properties.

These results suggest that the type of substrate used in brewing can affect the speed of conversion to alcohol and that further examination of the role of antimicrobials in the fermentation process may be warranted. However, there are some limitations of the study, including missing data and the inability to run some substrates through a GC-MS in their pure form, which are also discussed.

Future research could address these limitations and further explore the factors that influence the efficiency of alcohol production. This could include examining the impact of yeast's relationship with the specific nutritional content of the substrates, as well as conducting more extensive testing for antimicrobial properties. Overall, this study provides insight into the factors that influence the efficiency of alcohol production and the potential role of antimicrobials in the fermentation process.

Sponsored by: FURSCA - Bruce A. '53 and Peggy Kresge '53 Endowed Science Fellow

Sam Zink, '23
Major: Geology
Hometown: Winfield, Illinois

Modeling a Glass Ramp Paleoenvironment: Ceramic Demosponges of the Permian Phosphoria Rock Complex, Idaho
Faculty/Staff Sponsors: Madeline S. Marshall, Shauna Merriman

The Rex Chert member of the Permian-aged Phosphoria Rock Complex (PRC) of Idaho records an interval of atypical ocean conditions that favored biosiliceous sedimentation. This "glass ramp" environment was populated by meadows of sponges in a shallow sea along the western margin of North America. The Rex Chert is composed of disaggregated skeletal spicules of siliceous demosponges. Few intact specimens of PRC sponges are preserved, presenting challenges in reconstructing their forms in life.

This study utilizes an interdisciplinary approach to model assemblages and morphologies of PRC demosponges, combining limited fossil data with modern demosponge data to inform artistic fabrication of models. Complete or three-dimensional fossil demosponges are rarely preserved in an accessible way, due to the siliceous ooze that crystallized between spicules and other sediments during mineralization, making the fossils indiscernible from surrounding rock. This prevents the fossils from being excavated or fully viewed out of the rock.

The fully-cemented preservational style necessitates a conceptual reversal of the preservational processes that fossilized these sponges in the Permian to reconstruct their paleoenvironments. The sculpted lifelike models of these sponges are presented as a museum display in Albion's Science Complex. The goal of this project is to form a deeper connection between the viewer and the way these sponges existed in their lifetimes 270 million years ago. This serves as a scientific product, teaching tool, and artwork to invite a wide audience with varied knowledge of ancient organisms to interact with the specimens, allowing viewers to see past their imperfect fossil record.

Sponsored by: FDC, FURSCA - Julia Robinson Burd '31 Memorial Fellowship, The Paleontological Society

Armstrong Lectureship and Student Research Symposium Abstracts

This year's Elkin Isaac Student Research Symposium was preceded by the Armstrong Lecture and Student Research Symposium on March 31st. This event was set to coincide with the annual Armstrong Lecture for students who are unable to present their work at today's Elkin Isaac Student Research Symposium because they are attending an experiential learning trip oriented around medicine in Philadelphia. This serves as just one more example of all the exciting things Albion College students have done and continue to do.

Tess Anthony, '25
Majors: Biochemistry, Spanish
Hometown: Coopersville, Michigan

Synthesis of Azo-Asciminib to Inhibit the BCR-ABL1 Kinase
Faculty/Staff Sponsor: Craig Streu

Cancer is the uncontrolled cell growth and division within the body. The cancer drug asciminib targets a specific enzyme, BCR-ABL, which is a common cause of uncontrolled cell growth and division, halting those processes. Azo compounds are compounds with nitrogen-nitrogen double bonds. These bonds have the potential to be photo-switchable, meaning they change shape in the presence of UV light. Shape is key to a drug's function, and this property can be used as a light activated "on/off" switch for the drug. For my project, I have proposed and begun working on a synthesis that places an azo bond into the asciminib drug, giving this drug photo-switchable properties and limiting the side effects on the body.

Beyers

Ryan Beyers, '23
Major: Biology
Hometown: Saginaw, Michigan

Jade Patel, '23
Major: Biology
Hometown: Saginaw, Michigan

Patel

Isabelle Patel, '25
Major: Biology
Hometown: Saginaw, Michigan

Progress toward the Development of Nanobodies Related to Moonlighting Activity of S. aureus GAPDH via Directed Evolution
Faculty/Staff Sponsor: Craig Streu

Patel

Antibiotics have transformed healthcare and saved millions of lives. However, with the rapid emergence of resistant bacteria worldwide, decades after the first patients were treated with antibiotics, bacterial infections are once again a threat. A large reason for the surge in resistance is the overuse of common antibiotics. Another reason is due to moonlighting proteins. These 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. For this reason, moonlighting proteins are hypothesized to be a good target for combating antibiotic resistance. One of the most noteworthy bacteria that exploit these moonlighting proteins is Staphylococcus aureus, which contains the moonlighting protein glyceraldehyde-3-phosphate dehydrogenase (GAPDH). This is a key glycolytic enzyme, whose primary function is to aid in the oxidation of glyceraldehyde-3-phosphate (G3P) to 1,3-biphosphoglycerate (1,3-BPG) during glucose metabolism. In extracellular spaces, however, GAPDH has been associated with microbial pathogenicity. One approach to combating this pathogenicity is by interfering with the moonlighting activity of the protein. However, little is known about the origin of GAPDH's moonlighting activity, which highlights the need for chemical probes of extracellular GAPDH function. We herein report our progress toward the development and screening of nanobodies that bind to and modulate the moonlighting activity of S. aureus GAPDH via directed evolution.

Budd

Madeline Budd, '24
Major: Biochemistry
Hometown: Howell, Michigan

Mariah Brenz, '24
Majors: Biology, Biochemistry
Hometown: Grand Blanc, Michigan

Brenz

Teddy Hirschfield, '24
Major: Biochemistry
Hometown: Oxford, Michigan

Progress Toward the Synthesis of a Next-Generation Tyrosine Kinase Inhibitor
Faculty/Staff Sponsor: Craig Streu

Hirschfield

Currently, there are hundreds of drugs that have been developed to treat cancer, and numerous more in early developmental stages. These chemotherapy drugs work to kill uncontrollably dividing cancer cells. However, the drawback of these drugs is that they tend to strike against normal cells in the body as well. Ponatinib is a chemotherapy drug that treats both Chronic Myeloid Leukemia and Acute Lymphocytic Leukemia. These cancer types affect blood and bone marrow. The structure of Ponatinib contains an amide bond that can be replaced with an azo bond. This new azo bond would allow the molecule to change shape when illuminated with UV light. With careful design, it is possible to exploit this shape change in a way which activates the drug in response to very specific types of light. This is an advantageous therapeutic approach because the drug is able to be activated selectively only in the afflicted tissue. We are therefore working towards synthesizing a photoswitchable version of Ponatinib with the goal of eliminating the negative effects on noncancerous cells through an improved, second-generation synthesis.

Samantha Dye '23
Major: Biochemistry
Hometown: Canton, Michigan

Synthesis of Known Smoothened Inhibitor Azologues
Faculty/Staff Sponsor: Craig Streu

My research focuses on developing light-responsive versions of known smoothened inhibitors. Basal cell carcinoma, lung, breast, brain, prostate, and many more cancers can be caused by unregulated activation of the Hedgehog (Hh) signaling pathway. When Patched-1 is mutated and cannot properly repress Smoothened (Smo), Smo continually activates the protein complex that allows for Hh target genes to be regulated. The constant activation of these genes causes tumorigenesis in many types of tissue. Smoothened inhibitor drugs carry out the job of Patched-1 when a mutation prevents it from performing correctly. Although effective smoothened inhibitors exist, they are often accompanied by severe side effects that result from off-target activity. To more effectively target these drugs to reduce off-target activity, an azo moiety has been incorporated into their molecular architecture. These nitrogen-nitrogen double bonds change conformation in response to light. 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, thereby leaving healthy cells unharmed. Azologues of smoothened inhibitors in particular represent especially challenging synthetic targets. This work delineates the specific synthetic challenges and outlines the relative success of different synthetic strategies for overcoming these issues on two well-known smoothened inhibitors.

Edwards

Rayna Edwards, '23
Major: Biology
Manchester, Michigan

Fadwa Kamari, '23
Major: Biochemistry
Grand Rapids, Michigan

Kamari

Directed Evolution of a Nanobody to Bind Nipah Virus G-Protein
Faculty/Staff Sponsor: Craig Streu

Nipah Virus is a pathogenic zoonotic virus mainly spread through fruit bats that has caused sporadic outbreaks in southern Asia since 1998. The virus's symptoms range from respiratory distress to encephalitis, and have a mortality rate of 40-75%. Nipah Virus has recently been ranked in the "Top Ten Viruses Posing the Greatest Epidemic Threat" by the World Health Organization. Our research is working towards the creation of a nanobody, which is a small biological molecule, that can neutralize the G protein of the Nipah virus which causes infection of human cells. The G protein of the Nipah Virus is a large, glycosylated protein that reaches into the extracellular portion of the virus. This extracellular portion allows for identification of possible human host cells and binding that initiates infection at the molecular level. The creation of a nanobody will be achieved through directed evolution using yeast surface cell display. Nanobodies are a cheap alternative to antibodies that also prove more stable in dynamic environments, including the

human body. The use of directed evolution can narrow a diverse library of molecules to ones most characteristic of a potential binding protein nanobody. This presentation will describe progress toward the cloning and expression of a G protein fragment for use as a nanobody virus therapeutic. The application of the Nipah Virus therapeutic nanobody could provide a tool to treat viral infection in the host species of the fruit bat through aerosolization, preventing transmission into the human population.


Filbrandt

Peter Filbrandt, ’23
Majors: Biochemistry, Spanish
Hometown: South Haven, Michigan

Kaitlyn Piontkowsky, ’23
Majors: Biochemistry, Spanish
Hometown: Grand Rapids, Michigan


Piontkowsky

Directed Evolution of a T3SS Nanobody Targeting Plant Pathogens
Faculty/Staff Sponsor: Craig Streu

Antibiotic resistance poses an immediate threat to various systems, including the agricultural and healthcare systems. Due to this, novel antibacterial therapeutics are a necessity now more than ever. The Nipponbare variety of wild rice is vulnerable to bacterial infection by the pathogen Xanthomonas oryzae pv. oryzae, leading to poor crop yields. As a staple crop in numerous global regions, if the frequency of Xanthomonas oryzae pv. oryzae infections expand, food scarcity and other public health emergencies may ensue. This specific plant pathogen infects its host using the infectious transmembrane protein structure called the Type III Secretion System (T3SS). Several important Gram-negative pathogens use the T3SS protein structure as a channel to invade and transmit effector proteins into the host cell’s cytoplasm. For proper function, the protein subunits of the T3SS must be translated and arranged precisely. To inhibit the infectious capability of Xanthomonas oryzae pv. oryzae, we aim to disrupt the formation of the T3SS with the binding of a protein nanobody with high specificity to the T3SS subunit Hpa1. Small proteins such as nanobodies pose little risk for human consumption due to our ability to metabolize them, making them promising therapeutics within the agricultural industry. Furthermore, by rendering the bacteria non-pathogenic as an alternative to killing the bacteria, we theorize that this technique will prevent further bacteria evolution leading to antibiotic resistance. The determination of whether Xanthomonas oryzae pv. oryzae may be targeted in this way will give evidence to whether the numerous human pathogens that implement similar infectious schemes can be targeted with protein nanobodies. This presentation will illustrate the selection, cloning, and purification of a T3SS antigen for the directed evolution of nanobodies as a T3SS-targeting antibiotic.

Edith R. Gonzalez, ’23
Majors: Biochemistry, Public Health
Hometown: Los Angeles, California

Understanding Attitudes and Habits Regarding Data Use and Sharing in Advancing Materials Research
Faculty/Staff Sponsor: Lisa B. Lewis

The Materials Genome Initiative (and open science in general) has the goal of advancing the pace of scientific research through the use of data sharing and data methodologies (e.g., artificial intelligence). The extent to which the stakeholders in the materials research community have the knowledge and ability to embrace the habits and practices necessary for data sharing and using the datasets of others relies upon a fundamental change in culture about how we think about the practice of science. With this in mind, we surveyed researchers with a goal of answering these major research questions:

(1) How prevalent is the sharing and use of data in materials research?
(2) What are the current major impediments to FAIR data sharing?
(3) What are general attitudes with respect to the use of data in materials research? Are there differences based on field of expertise?
(4) How prevalent is the use of data-centric research approaches (such as machine learning and artificial intelligence) in materials research? Are there differences based on field of expertise?

We will report the outcomes of the survey, including any correlations between habits and opinions of researchers.

Max Griffin, ’25
Major: Biochemistry
Hometown: Birmingham, Michigan

Synthesis of Azo Entrectinib
Faculty/Staff Sponsor: Craig Streu

The purpose of this project is to synthesize entrectinib with an azo bond. The function of entrectinib is to inhibit the activity of the anaplastic lymphoma kinase (ALK), a receptor tyrosine kinase that assists in the development of certain tumors. The ALK enzyme becomes overactive because of oncogene fusion which can lead to lymphomas. Entrectinib causes many side effects because it impacts every cell’s function. Analogues of common drugs may be designed such that they can be activated with light in a way that localizes the active drug to just those tissues that need the treatment. This presentation outlines the design and progress toward the synthesis of an entrectinib azolog.

Jesse Hepner, ’23
Major: Chemistry
Hometown: Davisburg, Michigan

Development of Metal Nanoparticle-Carbon Microsphere Composites for the Catalytic Removal of Oxyanions from Water
Faculty/Staff Sponsor: Kevin Metz

Oxyanions represent a class of emerging contaminants due to their increasing concentration in water and known

negative health impacts. Perchlorate and bromate are two oxyanions that are particularly difficult to remove because of their high stability. Hydrogenation is a common approach for removal but is limited by catalyst cost. This research reports on the development of a metal nanoparticle-carbon microsphere composite that minimizes metal content, thus optimizing cost. The catalysts are made using ultrasonic spray pyrolysis (USP), producing highly porous carbon microspheres (CM) with metallic nanoparticles embedded in them. To date, we have studies of palladium and a variety of bimetallic systems. Our current results will be presented.

Diana Kernen, ’24
Major: Biochemistry
Hometown: Keego Harbor, Michigan

Progress toward the Synthesis of a Novel PD-1/PD-L1 Azologue
Faculty/Staff Sponsor: Craig Streu

Checkpoint inhibitors are among the most important recent developments in cancer therapy. These checkpoints are critical interactions between immune receptors and tumor cells, which prevent the immune system from recognizing and destroying tumor cells. Checkpoint inhibitors disrupt these interactions, allowing the immune system to recognize and destroy tumor cells. However, by interfering with the immune system’s self versus nonself recognition system, these drugs can also result in a broad array of side effects such as joint pain, confusion, seizures, headaches, and chest pain. Additionally, such checkpoint inhibitors are almost exclusively monoclonal antibodies, which are expensive to produce and require intravenous administration, generally in a medical setting. To address this issue, small molecule checkpoint inhibitors have been developed that lower production costs, increase stability, improve tumor penetration, and can be given orally. These molecules have surfaced on the market, but they too result in side effects for patients. However, it may be possible to avoid these potentially dangerous side effects by selectively activating the immune system specifically at the site of the solid tumor, so as to prevent the off-targeting autoimmune responses and reduce the potential for undesired side effects. Herein, we disclose the synthesis and testing of a novel phytopharmaceutical and progress toward the synthesis of a second-generation derivative that may be used as a site-selective checkpoint inhibitor.

Medha Mohan, ’25
Majors: Biochemistry, Data Science
Hometown: Bangalore, India

Scale-Up and Diversification of a Light-Activated PD/PD-L1 Inhibitor Scaffold
Faculty/Staff Sponsor: Craig Streu

Cancer is a life-threatening disease in which certain body cells grow abnormally and divide uncontrollably with the ability to infiltrate and destroy normal body tissues. Immunotherapy is a type of cancer treatment where an individual’s own immune system is boosted or changed to attack cancer cells in the body. Cancerous cells evade the immune system of the body by manipulating the checkpoints which are actually engaged in differentiating healthy cells and foreign bodies. T cells are key immune cells that have a surface protein called PD-1. When attached to its ligand PD-L1, PD-1 is recognized as its own cell, preventing T cells from attacking the normal cells and forming a linkage of PD-1 and PD-L1 known as immune checkpoint. By blocking this checkpoint protein with a light-activated checkpoint inhibitor, the immune system can be turned “on” in target areas of the body so fewer healthy cells are destroyed. My project is the synthesis of a small azo molecule checkpoint inhibitor drug which targets PD-L1. Azo-compounds are a class of molecules that have a nitrogen-nitrogen double bond and can switch from trans to cis conformation in response to ultraviolet light, and switch from cis to trans with longer wavelengths of light, thereby helping in targeted treatment of cancerous cells.

Alexis Moss, ’24
Major: Biochemistry
Hometown: Bloomfield Hills, Michigan

Synthesis of Derivatives of a Photoswitchable Tubulin Polymerization Inhibitor
Faculty/Staff Sponsor: Craig Streu

Cancer occurs 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, so these drugs have the potential for serious side effects that result from interfering with all microtubule assembly throughout the body. One approach to limiting the off-target side effects of cancer drugs is to activate them selectively within the body. One particularly exciting method for such selectivity is the use of light. For decades, scientists have been developing molecules that respond reversibly to light with structure changes in fields such as computing and energy. However, only recently has their application to human medicine been more fully explored. Specifically, if designed properly, these drugs can be activated by light. Since biomolecular drugs 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 photoswitchable molecule as a light-activated microtubule formation inhibitor. This talk will outline my progress toward the synthesis and optimization of this molecule.

Chase Potter, ’23
Major: Biochemistry
Hometown: Saranac, Michigan

Synthesis of a Photoswitchable Azologue of a Blockbuster Kinase Inhibitor
Faculty/Staff Sponsor: Craig Streu

Current chemotherapeutics have been effective in the treatment of various cancers; however, they often lack specificity, which can cause off-target side effects. Increased target specificity has been achieved through advanced modeling and a better understanding of drug-

binding mechanisms, but the ubiquity of kinases makes full specificity difficult. One way to further improve these specific kinase inhibitors is to turn them into photoswitchable pharmaceuticals, a class of drugs that can be selectively activated or deactivated in response to specific wavelengths of light. This approach allows for the selective activation of photopharmaceuticals in diseased tissue. Research in our group focuses on improving the pharmacologic profile of highly potent kinase inhibitors with notable side effects by introducing an azo bond. Specifically, we aim to modify imatinib, a treatment for chronic myeloid leukemia (CML). Imatinib inhibits the BCR-ABL enzyme, a protein that results from the fusion of BCR and ABL and is a common underlying cause of CML. This presentation will discuss progress toward the synthesis of azo-imatinib and the synthetic challenges associated with this approach to drug development.

Vedha Reddy, '24
Major: Biochemistry
Hometown: Ann Arbor, Michigan

Progress toward the Synthesis of Azo Danuglipron
Faculty/Staff Sponsor: Craig Streu

Small molecules, like most pharmaceuticals, exert their effects by binding to a very specific target molecule within cells. We propose to redesign these drug molecules in a way that incorporates a photosensitive group that changes shape in response to light. We can then exploit the shape change in response to light to control target binding and drug activity. One potential application is the specific activation of drugs within a very specific tissue, such as the liver, preventing the noxious off-target effects. This presentation outlines progress toward the synthesis and analysis of an azologue of a recent orally available diabetes drug.

Noelle Robert, '24
Majors: Biochemistry, Psychology
Hometown: Livonia, Michigan

Progress Towards the Synthesis of a Photoisomerizable Antagonist of the 5-HT2A Receptor
Faculty/Staff Sponsor: Craig Streu

5-hydroxytryptamine receptors (5-HT) consist of G-protein coupled receptors and ligand-gated ion channels. This receptor is the target of the amine neurotransmitter, serotonin. This receptor is highly complex and aids in many functions. Specifically, the 5-HT2A receptor is commonly known for its contribution to mood disorders, hallucinogenic effects, opioid addiction, and psychosis. This receptor is found throughout the central and peripheral nervous systems, but its specific function differs based on location. Due to the widespread abundance of this receptor, a drug with extreme selectivity is necessary to accurately manipulate its function. Fortunately, this can be achieved through the use of azo-compounds, which are colorful photoswitchable molecules containing a nitrogen-nitrogen double bond between two aryl rings. These compounds have the ability to switch their conformation when illuminated by ultraviolet light. For this project, I have designed a photoisomerizable azo compound to target the 5-HT2A receptor in the brain to create a selective spatial and temporal antagonist, allowing exquisite control for the study of neuronal circuitry. The structure was determined through computational molecular modeling, and it will be a modified azo-form of the existing drug, sarpogrelate. The drug is designed to photoswitchably bind to the target receptor and prevent further serotonin binding, aiding in a variety of neurological ailments due to the versatility of selective activation. We herein disclose the design, computational modeling, and progress toward the synthesis of a photoisomerizable azo compound that targets the 5-HT2A receptor in the brain to create a switchable research probe and antipsychotic drug.

Noah Rollison, '24
Majors: Biochemistry and Biology
Hometown: Grand Blanc, Michigan

Progress toward the Synthesis of a Photoswitchable Kinase Inhibitor
Faculty/Staff Sponsor: Craig Streu

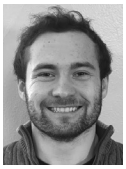
Chemotherapy drugs that target aspects of cell division and growth have been prescribed to cancer patients for decades. Often with these life-saving treatments, patients experience life-altering side effects because the drugs target not only cancerous cells, but healthy ones as well. As such, improvements in drug targeting are among the most promising developments in cancer treatment. A particularly exciting method of targeting drugs is with light, which is known as photopharmacology. Azo compounds, which contain a nitrogen-nitrogen double bond that can be reversibly isomerized between cis and trans forms in response to visible wavelengths of light, are among the most common types of photopharmaceuticals given their general stability and highly reversible photodynamics. 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 activated selectively 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 that result from off-target interactions of traditional chemotherapy drugs. Herein we describe the design, synthesis, and unique synthetic challenges for a novel azologue of a commercial kinase inhibitor.

Edison Symons, '23
Major: Biology
Hometown: St. Charles, Michigan

Synthesis and Validation of Photoswitchable c-Raf Inhibitors
Faculty/Staff Sponsor: Craig Streu

Cancer is a group of diseases that impacts a large portion of people worldwide. Current cancer drugs cause undesirable effects such as nausea, hair loss, and fatigue. A possible solution to this problem is the use of azo compounds, which are photoswitchable, allowing the drug's conformation to change from trans to cis in

response to a specific wavelength of light. This gives healthcare providers the ability to control the activity of the drug. One of the pathways involved in cancerous tumors is regulated by c-Raf. C-Raf has potential as an oncogene in various cancer subtypes. Novel molecule ZM336372 was developed to inhibit c-Raf in an effort to treat these cancer subtypes. However, this inhibitor never made it through developmental stages due to confounding results, which we hypothesize can be resolved by targeting drug activity using light. Based on this inhibitor scaffold, three target compounds have been designed to act as photoswitchable c-Raf inhibitors. Previous research showed success with the first two compounds, but one suffers from poor pharmacokinetic behavior and the second is predicted to have substantially reduced bioactivity over the parent compound. This presentation outlines progress toward the synthesis of the third target compound, which we hypothesize will display beneficial bioactivity and photokinetic behavior that we can later test through luminescence assays.



Paul Volesky, ’23
Major: Biochemistry
Hometown: Midland, Michigan

Progress toward the Synthesis of Photoswitchable Prosthetics for Common Antibiotics
Faculty/Staff Sponsor: Craig Streu

Bacterial resistance has been an emerging public health issue since the discovery of penicillin in the1940s. Today, overprescription and agricultural uses have accelerated the development of resistance to new antibiotics. Soon, our ability to treat bacterial infections or even perform common surgical procedures could be seriously compromised by the proliferation of resistant strains. At the same time, research and development into novel antibiotics have slowed to a pace not seen since the first commercialization of penicillin. One obstacle to commercialization of new antibiotics is the development of molecules that are safe for eukaryotic cells while maintaining high toxicity for bacteria. New strategies must be developed to overcome this obstacle. One such solution is the development of compounds that can be selectively activated in the infected tissue using light. Use of these compounds, known as photopharmaceuticals, can prevent damage to the surrounding tissue. One common approach for the development of photopharmaceuticals is the incorporation of a photo-isomerizable prosthetic group that changes the shape, and therefore the activity, of a drug in response to light. This project aims to incorporate such a prosthetic group into the structure of a well-known antibiotic for spatial control of antibiotic activation. We herein outline the rational design and the progress toward the synthesis of two subtypes of photo-sensitive antibiotics.

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/staff 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 Elkin R. Isaac Endowment Committee

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

The 2023 Isaac Student Research Symposium Committee

Craig Bieler (Chemistry)
Morgan Caroland (Library/Cutler Center)
Andrew Christopher (Psychological Science)
Katherine Hibbs (Marketing and Communications)
Lisa Lewis (Chemistry)
Jill Marie Mason, '01, Chair (Library)
Elizabeth Palmer, '10 (Library, Director of FURSCA)
Erin Smith (Library)
Carrie Walling (Political Science)
Ashley Woodson (Academic Affairs and Institutional 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 advisor; 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 to work on research or creative projects while earning a stipend. In addition to working closely with a faculty advisor, students participate in weekly seminars with other students in the program.

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