Student Symposium

SATURDAY, APRIL 24, 2021

SCHEDULE

Opening Keynote
President Jonathan Brand
8:30 - 8:45

Oral Session One
9:00 - 10:15

Poster Session One
10:15 - 11:00

Oral Session Two
11:00 - 12:15

OVERVIEW

Poster Session Two
1:30 - 2:15

Oral Session Three
2:15 - 3:30

Lunch Keynote
Provost Ilene Crawford
12:30

Oral Symposium Sessions

Session One 9:00am - 10:15am

Track One
Moderated by Craig Teague

Modeling the Pressure and Temperature Conditions in the Seve Nappe Complex, Västerbotten, Sweden
Geology
Author: Paige Klug
Sponsor: Emily Walsh

A Stalagmite Paleoclimate Reconstruction of Indian Summer Monsoon Variability from 1,400 to 4,000 Years Ago from Central Nepal
Geology
Author: Carson Wiggins
Sponsor: Rhawn Denniston

Physics Labs Best Practices
Physics & Engineering
Author: Evan Mills
Sponsor: Kara Beauchamp

Track Two
Moderated by Lynne Ikach

Privatization in Russia: Societal, Economical, and Long-Term Impacts
Russian Studies
Author: Ryan Williams
Sponsor: Lynne Ikach

Transgender Community and the Field of Social Work: Reviewing and Discussing Current Social Work Approaches
Psychology
Author: Kevin Kerner
Sponsor: Steven Neese

***Pelléas et Mélisande*: Two Divergent Paths**
Music
Author: Maura Quinn
Sponsor: James Martin

Oral Symposium Sessions

Session One 9:00am - 10:15am

Track Three

Moderated by John Gruber-Miller

How Self-Reported Physical Activity Habits and Mental Health Are Affected by a Global Pandemic
Kinesiology
Author: Alexis Woywod
Sponsor: Justus Hallam

Coronavirus Case Reporting in Iowa Schools: Problems, Policies, and Potential Solutions
Politics
Author: Clara Haverstic
Sponsor: Megan Goldberg

Deepfake Detection: Approximating Amateur Deepfake Susceptibility Through Deception-Based Experimentation
Data Science
Author: Jack Bressett
Sponsor: Megan Goldberg

Track Four

Moderated by Christina Penn-Goetsch

Shonibare and the Four Medusas
Art & Art History
Author: Fiona Glowacki
Sponsor: Christina Penn-Goetsch

Art as the Experience: George Floyd Square
Art & Art History
Author: Armani Rogers
Sponsor: Christina Penn-Goetsch

The Victory of Medusa: Feminism, Determination, and the #MeToo Movement
Art & Art History
Author: Kaitlyn Griswold
Sponsor: Christina Penn-Goetsch

Oral Symposium Sessions

Session Two 11:00am - 12:15pm

Track One
Moderated by Lewis Kanyiba

Frass as an Estimator of Age in Monarch Caterpillars
Biology
Author: Isaac Chen
Sponsor: Tammy Mildenstein

A Compositional Analysis of the Vegetative Habitat Selected by the Mariana Fruit Bat (*Pteropus mariannus*)
Environmental Studies
Author: Erin Hosto
Sponsor: Tammy Mildenstein

Predicting Transition Probabilities in Discrete Stationary Random Walks with Computer Vision
Mathematics & Statistics
Author: Jack Bressett
Sponsor: James Freeman

Oral Symposium Sessions

Session Two 11:00am - 12:15pm

Track Two

Moderated by Greg Cotton

The Act of Existing: Feminism in Palestinian Art
Art & Art History
Author: Izabella Botto
Sponsor: Khristin Landry-Montes

Shaft Tomb Figures of Ancient West Mexico Elite
Art & Art History
Author: Ariana Ramirez
Sponsor: Khristin Landry-Montes

Stela C, Tres Zapotes: The Cross Influence Between the Epi-Olmec and the Pre-Classic Highland and Piedmont Maya, and How that Shaped Classic Maya Culture
Art & Art History and Archaeology
Author: Blake Thornton
Sponsor: Khristin Landry-Montes

Oral Symposium Sessions

Session Three 2:15pm - 3:30pm

Track One
Moderated by David Yamanishi

Music for the Mind and Soul: "Plus bele que flor" in the La Clayette Manuscript
Music
Author: Maura Quinn
Sponsor: Jama Stilwell

Lighting Design as Performance; Using Lights to Evoke Emotion in an Audience
Theatre & Dance
Author: Elizabeth Koetz
Sponsor: Scott Olinger

Innovations in a Vacuum: Practical Considerations When Building a Dust Collection System
Theatre & Dance
Author: Bennet Goldberg
Sponsor: Cade Sikora

Track Two
Moderated by Kara Beauchamp

Using Paper Test Strips to Evaluate the Effectiveness of "Waste" Plant-Material to Remove Metal Ions from Water
Chemistry
Authors: Marissa Hartz & Robyn Luchesi
Sponsor: Charles Liberko

Developing Sustainable and Collaborative Educational Curriculum in Maya Villages, Data from the Yucatec Cenotes Project
Art & Art History
Authors: Maryellen Hinken & Ariana Ramirez
Sponsor: Khristin Landry-Montes

The Messages and Materials of the Moche "Sex Pots"
Art & Art History
Author: Shae Ennis
Sponsor: Khristin Landry-Montes

Oral Symposium Sessions

Session Three 2:15pm - 3:30pm

Track 3
Moderated by Megan Altman

Home, Belonging, and Latin America
Philosophy and Spanish
Author: Alex Nelson
Sponsors: Megan Altman and Michael Mosier

"Can we get a little help over here?": How the Lack of Individualized Education Can Impact Students in a Developing Country
Education
Author: Stefany Cruz
Sponsor: Jill Heinrich

Monarch Butterflies and Mowing
Environmental Studies
Author: Emma Brunstrom
Sponsor: Tammy Mildenstein

Track Four
Moderated by Greg Cotton

Looking for Gender in the Minoan Color Convention at Knossos
Gender, Sexuality, & Women's Studies
Author: Emma Carter
Sponsor: John Gruber-Miller

The White Supremacist Coup on the Capitol Was Patriotic
Art & Art History
Author: Azurite Montgomery
Sponsor: Christina Penn-Goetsch

Archaeologies of 'Minoan' Ethnicity
Archaeology
Author: Emma Carter
Sponsor: John Gruber-Miller

Poster Symposium Sessions

Poster Session One 10:15am - 11:00am

Moderated by Niloofar Kamran

Capture of CO_2 Using Functionalized Graphene: The Role of Hydrogen Transfer
Chemistry
Author: Jack Prebish
Sponsor: Craig Teague

Symbiotic Algae in Marine Snails: Why?
Biology
Author: Solomon Ogbevire & Madison Charles
Sponsor: Craig Tepper

Invertebrate Biodiversity in Benthic Zones of Streams
Biology
Authors: Justyna Kruczalak & Ciera Davis
Sponsor: Tammy Mildenstein

Analyzing Mineral and Protein Content in the Fruit-Based Diet of the Mariana Flying Fox
Chemistry
Author: Elizabeth Koetz
Sponsor: Cynthia Strong

Gesture Controlled Piano
Physics & Engineering
Author: Will Dragon
Sponsor: Niloofar Kamran

Neonicotinoid Contamination in Northern Leopard Frog Brains
Biology
Author: Lilian Heinzel
Sponsor: Marty Condon

Poster Symposium Sessions

Poster Session Two 1:30pm - 2:15pm

Moderated by Leon Tabak

A Stalagmite Record of Glacial-Age Climate Change from the Southwestern Ozarks
Geology
Author: Gabe Amber
Sponsor: Rhawn Denniston

Investigating Ion Channels in Models of Parkinson's Disease
Biochemistry & Molecular Biology
Author: Sydney Meeker
Sponsor: Barbara Christie-Pope

Fire Coral Under Fire: Can Algae Save Coral from Global Warming?
Biochemistry & Molecular Biology
Author: Mara Schwiesow
Sponsor: Craig Tepper

Gene Expression in *Blepharoneura*, Regarding the Functions of Melanization, Encapsulation, and the Phenoloxidase Pathway
Biology
Author: Justyna Kruczalak
Sponsor: Isaac Winkler

Examining the Associations Between Rumination Subscales and OCD Dimensions Among Veterans with Military Sexual Trauma
Psychology
Author: Kenna Ebert
Sponsor: Steven Neese

Design and Synthesis of Phenyloxazoles for the Study of Potential Anti-Leishmanial Activity
Chemistry
Author: Allison Eikenberry
Sponsor: Craig Teague

Role of the Density Functional in Graphene-Based Carbon Dioxide Capture Systems
Chemistry
Author: John Linderman
Sponsor: Craig Teague


ABSTRACTS

Gabe Amber, '21
Geology

Thetford Center, VT
Rhawn Denniston

A Stalagmite Record of Glacial-Age Climate Change from the Southwestern Ozarks

Studies of climate proxies (ice cores, ocean sediments, stalagmites, etc.) reveal that the climate of the last ice age (110,000-11,000 years ago) was characterized by extraordinary variability both in temperature and in precipitation. These rapid shifts in climate, called Dansgaard-Oeschger (D-O) events, have been identified in many parts of the world including Western Europe, Greenland, the American Southwest, Peru, and Southeast Asia, and through them we are developing an increasingly well resolved understanding of the global climate system's response during periods of profound change. One region where these reconstructions are sparse, however, is the Midwestern United States. Here we present the results of a study that aims to fill that gap by examining the climate signals in an ice age stalagmite from Cosmic Caverns, northwest Arkansas.

Stalagmites are composed of calcium carbonate ($CaCO_3$), and climate signals in stalagmites are recorded by their carbon ($^{13}C/^{12}C$) and oxygen ($^{18}O/^{16}O$) ratios. Carbon isotopes reflect changes in climate through its influence on vegetation (trees vs. grasses) and water infiltration, while oxygen isotopes record changes in air temperature. Stable isotopes were measured every millimeter along the central growth axis of stalagmite CS-3, and its age was determined by uranium-thorium dating. A total of six dates with average age uncertainties ranging between ±130-1380 years was used to develop a growth model and reveal that CS-3 grew from approx. 53,600 - 36,100 years ago. Stable isotope ratios reveal a striking similarity to D-O events recorded in Chinese stalagmites and Greenland ice cores in both structure and age. D-O events are numbered, and CS-3 spans the interval of D-O events 13-7. We interpret these changes as reflecting shifts in the proportion of trees to grasses over the cave, with warmer, wetter conditions linked to expansion of forest. The oxygen isotope ratios also shift in concert with D-O and suggest that temperature rose and fell in the Ozarks in concert with Greenland.

Caleb Blair, '21
Classical Studies

Dubuque, IA
John Gruber-Miller

Greek Pottery and the Black Figure

Depictions of race in Ancient Greek ceramics is a very complex issue, since it brings modern views, impacted by the more recent history of race-based slavery and race-based conflict into the viewing. Both scholars and museums use a variety of descriptions and methods for displaying and discussing race, such as an empirical approach that does not address the topic of race, an exhibit based on current political and social trends, and a mix of museum pedagogy and education. This paper looks at how museums describe and label the distinction between race in Ancient Greek ceramics, or if they focus on other aspects of the figures instead. Specifically, this paper focuses on the complexity of the issue, with the problems different terminology causes, how easy it is to bring modern views on race into the viewing, and how to address the topic of race in a museum. This paper also shows why museum pedagogy with a multiliteracies approach, of where not only the artifacts speak to the viewer, but also verbal, visual, and technological literacy is the best way to discuss race within a museum. A museum pedagogical approach based in multiliteracies focuses not only on what is being displayed by the museum but how exhibits allow the visitors to interact with the artifacts and their labels, and the visitors' experiences and perspectives, by focusing on the interaction between the artifacts and the visitors. The best way to create greater interaction is through spatial, textual, and technological literacies. Some modern museums displaying their artifacts and labels online allowed for a partial investigation of how these museums describe and label figures depicted with mixed racial characteristics on Ancient Greek ceramics, and what pedagogical approach modern museums take when addressing the issue of race within the context of Ancient Greek ceramics.

There is no perfect solution for addressing this subject, and every potential solution has its own set of problems, but by utilizing museum pedagogy, museums can interact with visitors in a way that still shares the intended information with the viewer, while still allowing the visitor to engage with the artifacts and discover something useful for themselves.

Izabella Botto, '21
Art & Art History
Khristin Landry-Montes

The Act of Existing: Feminism in Palestinian Art

Located between the Mediteranean Sea and Jordan, the State of Palestine is broken into different territories that are separated by border walls and checkpoints that are controlled by the Israeli Defense Forces. Palestinians live under Israeli occupation as the state of Israel continues to expand and forcibly push indigenous Palestinians from their homeland. Amidst human rights abuse and social tensions, art has become an outlet for hope and Palestinian resistance against occupation, both in a formal and informal context. Art appears along the border wall that separates Israel and the West Bank, often in response to political and social issues. Female Palestinian artists face many obstacles in a patriarchal society under military occupation, but aim to educate the world on Palestinian history and preserve identity. Hanaa Hamash, a Palestinian artist, paints murals of women who have fought against Israeli settlement throughout history. Hamash is clear that her work keeps Palestinian history alive and she aims to help female artists pursue their passions.

In an interview I conducted with Palestinian artist Dana Barqawi, she states that she uses beauty in her art to attract the viewer and to "question mainstream narratives" because "we live in a world where information and narratives are controlled by a few powerful groups." Barqawi embellishes old photographs of Palestinians with gold leaf, paint, and a variety of organic materials to enrich the culture and history of indigenous people. Barqawi is very inspired by the women in her family, and she aims to connect Palestinains living in diaspora back to the homeland. Barqawi explains that creation is existence and a way to share who Palestinians are with the rest of the world. Barqawi's work is just one example of the unyielding hope that can be found in Palestinian women and their art, as well as a reminder to the rest of the world of their history and culture. This project was made with ArcGIS StoryMaps, which provides the viewer with a visual experience when learning about the indigenous people of Palestine and the importance of art. It is a reminder that art should be shared and enjoyed without borders and restrictions.

Jack Bressett, '21 **Cary, IL**
Mathematics & Statistics *James Freeman*

Predicting Transition Probabilities in Discrete Stationary Random Walks with Computer Vision

With respect to today's memoir craze, readers seem to expect factual truth and are generally unforgiving of truth-
In this study, random walks took place on a two-dimensional, bounded grid. The walk is completely determined by its transition probabilities, the probabilities of moving in each direction on a given step. Observing each step on an infinite grid, the probabilities can be predicted by computing relative frequencies of directions moved. By the law of large numbers, the larger the walk, the better the estimate. However, if the grid is bounded, there is a problem at the corners because we cannot determine which direction the walk attempted to move. So, relative frequency estimation in this case will be less accurate. Because of this, observing the walk and calculating the transition probabilities from relative frequencies is trivial and we call this the Live Predictor. But consider the direction is not observed at each time step and at each pixel in the bounded grid, we store the frequency the walk visited that pixel. Is it even possible from this limited information to recover the transition probabilities used to generate the walk? To answer this, I created the Affine Convolutional Ensemble (ACE) and the Parallel Auto-Encoded Convolutional Ensemble (PACE) models to compute the transition probabilities for a given image. ACE had a mean Root Mean Square Error (RMSE) of 0.023 in any direction, which is very desirable when compared to the Live Predictor's mean RMSE of 0.018 in any direction. The twice as small, compressed PACE model had a mean RMSE of 0.0529 in any direction. These results are significant since the Live Predictor had significantly more information and significantly less randomness than ACE and especially PACE. Another metric was the average absolute distance between the sum of the predicted probabilities and one. The ACE model had an average absolute distance of 0.0061 which is roughly the same as PACE's score of 0.0065. This means my models learned the fundamental axiom of probability to a high degree of certainty without being explicitly programmed to do so. These models improve with increased dimension size and can be applied to higher-dimensional walks.

Jack Bressett, '21 **Cary, IL**
Data Science *Megan Goldberg*

Deepfake Detection: Approximating Amateur Deepfake Susceptibility Through Deception-Based Experimentation

For this paper, I created a deepfake video of former President Donald Trump and conducted a randomized study to approximate the proportion of participants who could detect whether the media was phony or not. The participants watched one of three different videos at random while being informed that the video was of Donald Trump speaking, regardless of the true video content. The three videos included a control video of Trump, a parody video of Alec Baldwin, and the deepfake. The deepfake was made using a deep neural network that recreated the face of Trump onto the face of Baldwin during a 2016 Saturday Night Live monologue. I then asked participants questions about the video and used unsupervised machine learning and natural language processing techniques to cluster and process the responses. Using an Analysis of Variance (ANOVA) test, I was able to compare the difference in responses from the three different video groups in addition to differences between political clusters. Through my hypothesis testing, I am 95% confident the true proportion of times the deepfake was detected is between 0.6571473 and 0.8711455, and was measured to be 0.7813. This proportion was statistically significantly higher than the control video, which had a rate of 0.0834, but was not statistically different than the parody group, which had a rate of 0.75. Additionally, I analyzed the sentiment used to describe each of the videos and found the control video had statistically significantly worse sentiment from the Liberal cluster than the Independent or Conservative cluster. I found no significant differences between the political clusters for the deepfake and parody video, but, across every video, the Independent group was the most positive.

Emma Brunstrom, '21 **Elk Mound, WI**
Environmental Studies *Tammy Mildenstein*

Monarch Butterflies and Mowing

Additional Author: Tammy Mildenstein

Milkweed, the sole plant monarchs will reproduce on, has been banished to roadside ditches, hayfields, and the small fraction of land that has been restored or kept as prairie. After being mowed down, milkweed plants grow back in dense clusters if there are no other equally-competitive plants around. One might assume the increase in milkweed density and population would encourage more monarchs to reproduce, but this has never been proven; it may be some other factor that draws a monarch to lay her eggs on a given milkweed in a given location. In order to determine whether mowing is an effective management technique for monarch habitat, I observed select milkweed plants in two different locations with two different management styles and measured the reproductive activity of monarchs on these plants. This study revealed that between the two sites, milkweed grew 10 cm taller on average at the un-mowed site. Regardless of location, plants that hosted monarch reproduction were taller by the same margin. Because monarchs can survive and successfully reproduce on grasslands intended to produce hay for livestock, a good understanding of how constant mowing affects them is necessary for managers to plan their mowing to help the resident monarch population thrive. It is also important to further research how mowing should be used by managers hoping to restore their land to tallgrass as done at Muddy Creek. Although it is hard to know the importance of the monarch's role in the prairie ecosystem, their extinction would have far-reaching effects.

Emma Carter, '21 **Newton, IA**
Gender, Sexuality, & Women's Studies *John Gruber-Miller*

Looking for Gender in the Minoan Color Convention at Knossos

The Minoan peoples of Bronze Age Crete are often described as having clear distinctions between the roles of men and women in religious contexts, with women often in a more prominent role. Frescoes which depict human figures are often used as evidence to support this claim. The gender of figures in frescoes may be identified based on figures' skin colors. Red indicates a man, whereas white skin indicates a woman. However, looking at other aspects of figures—bodies, adornments, and actions—we see quite a bit of overlap between how red and white figures are depicted. Simply looking to identify which figures are women and which are men, however, tends to assume that gender is always relevant and that its meanings are relatively stable and universal. By taking a step back from this assumption and instead asking what traits are used to differentiate figures and what identities those traits might signify, it is possible to look at how identities are constructed, how they may be entangled with one another, and how they may vary by context.

I examine a number of figures from Minoan frescoes—primarily from the site of Knossos—to ascertain how figures are differentiated based on three criteria: 1) bodies—shape, color, and size; 2) adornments—clothing, hairstyle, and jewelry; and 3) actions—posing, gesture, and setting. If the patterns of difference between figures do not align with the color convention, it would seem likely that either color does not symbolize gender or gender was not the most relevant aspect of identity for individual figures within the scene. If the color convention does hold but figures are portrayed in a way that is not in keeping with typical conceptions of Minoan gender roles, then it may be archaeologists' understandings of how Minoans expressed gender which need to be questioned.

Emma Carter, '21 **Newton, IA**
Archaeology *John Gruber-Miller*

Archaeologies of 'Minoan' Ethnicity

Given that Arthur Evans—the archaeologist who popularized the 'Minoan' civilization of Bronze Age Crete—deliberately interpreted evidence with the goal of painting the 'Minoans' as white and proving Europe's superiority over cultures of Africa and the Middle East, I address the question of what modern archaeologists can do and have done to dismantle this narrative. I start by examining the version of the 'Minoans' imagined by Evans and exactly how he furthered a nationalist agenda by describing the 'Minoans' as a distinct (white) ethnic group. I then take a look at various ways in which modern archaeological research has approached 'Minoan' ethnicity to discuss the strengths and weaknesses of the methods and materials used—mortuary evidence, DNA testing, and foreign iconography—and how, by using a variety of approaches, archaeologists can discuss ethnicity with more nuance.

There has been debate over whether looking for ethnicity in the archaeological record is a worthwhile endeavor at all, and none of these methods are likely to supply concrete conclusions on how 'Minoans' conceived of their own ethnicity. However, because an ethnic identity has already been ascribed to the 'Minoans' as part of a nationalist agenda, it is integral that archaeologists directly address ethnicity in their research to show where and why it is so complex and to dismantle nationalist historical narratives.

Isaac Chen, '21 **Iowa City, IA**
Biology *Tammy Mildenstein*

Frass as an Estimator of Age in Monarch Caterpillars

Additional Author: Tammy Mildenstein

Monarch butterflies (*Danaus plexippus)* are a well known species of North American butterfly, which have been the focus of monitoring programs for decades. Monitoring for larvae is largely dependent on finding the caterpillars directly, but indirect methods such as chew marks on milkweed leaves and left-behind frass also have potential to assist in estimating the populations of monarch caterpillars. However, there are few studies addressing the potential of using indirect evidence in monitoring programs. The goal of this study was to examine if caterpillar frass could be used to identify and correctly age monarch caterpillars once present by measuring its size.

I combined data from Marcelo Tanon's 2018 project with new data from two caterpillars grown in captivity. I measured the size of each piece of frass against the size of each caterpillar daily.

I found a very close positive correlation between frass size and the size of the caterpillar ($r = 0.8599$). When aggregated into average size for all frass pellets each day, the correlation increased ($r = 0.9431$).

These results suggest that caterpillar size can be estimated from the size of the frass it leaves behind, which can in turn be used to estimate the age of the caterpillar. This non-invasive method of detecting caterpillar presence will be useful for augmenting the population data derived from monarch caterpillars found directly in prairie surveys. The conservation-focused activities, research, and management can benefit from incorporating this new method in monarch presence/absence monitoring, population abundance assessment, and age-specific mortality population models. Monarchs are facing increasingly severe problems, and the continued conservation of the species requires new tools and survey methods to work with limited resources to be more effective at tracking populations.

Kenna Ebert, '22 **Fayetteville, AR**
Psychology *Steven Neese*

Examining the Associations Between Rumination Subscales and OCD Dimensions Among Veterans with Military Sexual Trauma

Additonal Authors: Shelby J. McGrew, C. Laurel Franklin, & Amanda M. Raines

Obsessive-compulsive disorder (OCD), a psychiatric condition characterized by unwanted thoughts and repetitive behaviors, is linked with high levels of distress and impairment. Research has identified four common symptom dimensions of OCD: contamination, responsibility for harm, symmetry/ordering, and unacceptable thoughts. Rumination, the act of repetitively and passively analyzing one's symptoms of distress without making changes, has been identified as a potential cognitive risk factor underlying the development and maintenance of OCD. Recent research has identified two subscales of rumination: reflection and brooding. Existing research links brooding with overall OCD symptom severity and overall rumination severity with the unacceptable thoughts OCD dimension. However, there is a lack of research investigating the relationship between rumination subscales and OCD dimensions simultaneously. Thus, the purpose of the current study was to examine the relationship between specific rumination subscales and OCD symptom dimensions. It was hypothesized that there would be a relationship between brooding rumination and the unacceptable thoughts dimension of OCD. The sample consisted of 54 veterans (M_{age} = 45.89; 70% female; 61% African American) presenting to a Veterans Health Administration (VHA) Military Sexual Trauma (MST) clinic for psychological services. As a part of their intake evaluation, veterans completed a brief battery of self-report questionnaires including the Dimensional Obsessive-Compulsive Scale (DOCS) and the Ruminative Response Scale-Short Form (RRS-SF). Results showed that the RRS-SF brooding subscale, but not the reflection subscale, was significantly associated with all four DOCS symptom dimensions, with the strongest association with unacceptable thoughts.

Allison Eikenberry, '21 **Neola, IA**
Chemistry *Craig Teague*

Design and Synthesis of Phenyloxazoles for the Study of Potential Anti-Leishmanial Activity

Leishmaniasis is a parasitic infection transmitted by sandflies that affects 350 million people in 98 countries worldwide. The infection is accompanied by symptoms such as substantial weight loss, anemia, enlargement of the spleen and liver, and a prolonged fever. Ultimately, a leishmaniasis infection is fatal without treatment. Leishmaniasis is classified as a Neglected Tropical Disease, which means that it affects some of the world's poorest populations, thus limiting monetary incentive for new treatment options. Currently, the treatment options have dangerous toxicity profiles, demonstrate variable efficacy, and require painful IM injections or lengthy IV administrations. These current treatments are not practical for use in remote, third world populations. Therefore, a strong need exists for safe, efficacious, and orally available treatments for leishmaniasis. A high throughput screen identified an initial hit molecule (DNDI0003202883) that demonstrated anti-leishmanial activity in axenic (extracellular), infected cell (macrophage), and cell based (THP1) assays performed by the University of Dundee. In this study, we used medicinal chemistry and computational chemistry to facilitate a remote design collaboration to investigate the structure-activity relationship of DNDI0003202883. To explore unique chemical space around DNDI0003202883, the fused aryl core of this compound was replaced with a phenyloxazole. Various analogues of this phenyloxazole derivative were strategically designed to probe its structure-activity relationship. Synthesized analogues were submitted for potency testing in *Leishmania infantum* cell-based (PMM) assays by the University of Antwerp. The activity data from the assays suggests that the structure-activity relationship of DNDI0003202883 may be very narrow and that replacing the fused aryl core with a phenyloxazole does not improve potency.

Shae Ennis, '21
Art & Art History

Des Moines, IA
Khristin Landry-Montes

The Messages and Materials of the Moche "Sex Pots"

The Moche inhabited what is now Peru's North coast between 100 to 800 CE and produced a large amount of diverse ceramics widely collected by museums today. Moche ceramicists depicted a variety of subject matter on mold produced vessels, many of which are sculpted into figures, while others are plain in form and sport detailed painted scenes. A sub-group of the sculptural vessels is widely known as "sex pots" because of the seemingly erotic scenes they depict. Imposing Western terms like "sexual," "erotic," and "pornographic" onto Moche ceramics, however, controls how they are perceived and is a colonial act that simplifies the vessels' layered cultural meaning. Mary Weismantel explains Moche's "sexual" imagery was likely not sexual, but a symbol of Moche ideology concerning cyclicality and the transference of life-giving substances. Following Weismantel and employing Alfred Gell's theories on art and agency, I argue that Moche vessels had social agency within Moche society. The vessels embody powerful liminal spaces of interaction between peoples, places, and other things. Therefore, they are better understood as "vitality vessels." "Vitality" because they were treated as alive and carried life-giving substances. "Vessel" because the term allows us to understand Moche ceramics beyond the literal and lifeless term "pot"—humans can be a "vessel" for life, for instance. The Moche vessels are in this sense more like us than they are like other things of the non-animate Moche world. Their role as such, along with the substances they were made of and carried, is discussed at length in this thesis.

Fiona Glowacki, '21
Art & Art History

Newton, IA
Christina Penn-Goetsch

Shonibare and the Four Medusas

Yinka Shonibare is a widely known and researched contemporary artist; he is known for his installation pieces that often show headless and racially ambiguous mannequins dressed in "African" fabrics. Yet despite his popularity in the art world, his four tondos of *Medusa North, Medusa East, Medusa South*, and *Medusa West* have received very little attention. The two most significant sources that directly talk about the four Medusas are a website by James Cohan that is a gallery description and one article by Valérie Morisson. Perhaps the works have been overlooked because they have many anomalies in terms of Shonibare's *oeuvre*; these anomalies include decapitated heads with distinct racial markers. He often avoids such markers so that the art he creates is deliberately racially ambiguous. These anomalies *appear* to break with his usual mode of representation and the intentions behind his work; however, this is not the case.

In the four tondos of *Medusa North, Medusa East, Medusa South*, and *Medusa West*, Shonibare explores similar ideas to his previous works and investigates the complexity of victimization experienced all around the world from a human-made climate crisis. First, I will discuss what is characteristic of Shonibare's works and the Dutch wax fabric that he uses. This discussion will be followed by an examination of the story of Medusa and Shonibare's use of Carravaggio's version as a model. Most can see the anomalies in the four tondos when comparing them to other works in which Shonibare recreates iconic pieces of art from history. Next, I will address the context of the show that included these photographs, and, finally, address the climate report of 2014 that inspired the exhibition of 2015. In the end, the conceptual foundations of Shonibare's creation will prove to be in keeping with the intentions found in his other installations that address complicated and serious questions in a decidedly playful manner.

Bennet Goldberg, '21
Theatre & Dance

Deerfield, IL
Cade Sikora

Innovations in a Vacuum: Practical Considerations When Building a Dust Collection System

Sawdust, metal powder, and other air-borne particles increase the long-term dangers of operating in workshops and studios more than any power tool in them. These environmental hazards are ignored or neglected as their damages are not often noticed until far later in one's life. Installing a dust collection system is one of the only effective ways to drastically reduce a working environment's airborne particles. This was the main reason why I designed, budgeted, built, and fine-tuned a long-anticipated dust collection system for the Cornell College Department of Theatre and Dance's Scene Shop.

As most dust collection systems are designed to meet the needs of the individual settings they are built in, relevant information on dust collection is not readily available or mainstreamed. It is my hope to help make things clearer to the uninitiated and help correct some misinformation on operating dust collection systems. Their uses are not limited to the theatre and can improve the air quality of almost any working space. Throughout this process, I introduced a handful of innovations to existing dust collector designs and optimized the system's performance, with a balance between cost-efficiency and prolonged stability. I solved the challenges of designing a permanent installation in an area where space is not readily available. I examined the importance of proper building materials, deliberated the benefits behind fabricating custom blast gates or couplings, made decisions to increase user safety including reducing risks of combustions or fires, and learned how basic Finite Element Analysis modeling can be used to help test prototype designs.

Kaitlyn Griswold, '21
Art & Art History

Oklahoma City, OK
Christina Penn-Goetsch

The Victory of Medusa: Feminism, Determination, and the #MeToo Movement

On October 13th, 2020, a bronze statue replica of *Medusa with the head of Perseus* by Luciano Garbati was placed outside across the street from the New York County criminal courthouse in Manhattan, the same courthouse where Hollywood mogul Harvey Weinstein's conviction occurred. Medusa is standing tall with her shoulders back while holding tightly onto the head of Perseus by the hair with determination engraved upon her face. She becomes a victorious symbol, showing the world that her life no longer ends with her persecution. With the adoption by the #MeToo movement, *Medusa with the head of Perseus* changes the traditional topos of Greek mythology, allowing Medusa to become a powerful figure that others can relate to while continuing her story. The power that was once momentarily lost becomes reclaimed.

I begin with this work's recent installation and discuss the artist's original inspiration. In 2008, the original resin figure, standing at seven foot three, reversed the myth on a monumental scale; the figure resurfaced in 2018 when it got adopted as a symbol for the #MeToo movement. (Payne, 2018) Garbati grew up just outside of Florence and revealed that the impressive nude figure is a response to Benvenuto Cellini's *Medusa with the head of Perseus*, a 16th-century work. (Griffin, 2018) Cellini's piece is located in the Loggia Dei Lanzi and conveniently near the Uffizi museum, the location in which both Caravaggio's Medusa and Artemisia Gentileschi's *Judith Slaying Holofernes* reside. Cellini's bronze illustrates the story told within Ovid's Metamorphosis, a story that includes sexual assault. By critically analyzing the deep misogynistic views suggested by the representations of this subject, someone can understand the resulting anger and how empowering such a figure could be cathartic and a possible symbol for the #MeToo movement. Additionally, Medusa's position within feminist literature has been a long important one. The reason behind the choice of Garbati's sculpture as a celebratory figure of feminist victory may be apparent; however, in the end, the placement of the bronze version across from the criminal courthouse conveys an ambiguous message.

Marissa Hartz, '21
Robyn Luchesi, '21
Chemistry

Chicago, IL
Charles Liberko

Using Paper Test Strips to Evaluate the Effectiveness of "Waste" Plant-Material to Remove Metal Ions from Water

The main goal of this project was to develop a method to remove metal ion contaminants from wastewater in remote locations using locally sourced materials. In order to accomplish this, inexpensive visual tests for metal ion concentrations were developed by forming highly insoluble colored metal ion precipitates. Samples of synthetic wastewater were micropipetted onto filter paper that was pretreated with a fixative reagent. Once dry, the test strips were developed using the appropriate reactive ion, producing colored spots whose sizes were proportional to the initial metal ion concentration. The pretreated paper test strips detected metal ion concentrations as low as 50 μM. Similar test strips using color-intensity to estimate metal ion concentration were not as reliable.

The development of these test strips allowed for the simple and efficient exploration of various plant-based adsorbent materials for their ability to remove metal ions from water. This study looked at "waste" plant-materials, such as treated sawdust, brown rot, and white rot wood, which are widely available. It was found that these materials are comparable to black tea leaves in their ability to remove Pb^{2+} and Ni^{2+} contaminants from water; however, they are much more abundant in remote locations.

Clara Haverstic, '23
Politics

Moundville, MO
Megan Goldberg

Coronavirus Case Reporting in Iowa Schools: Problems, Policies, and Potential Solutions

In Iowa, Governor Kim Reynolds has mandated that schools offer in-person schooling, which has been met with a mix of support and backlash. One chief concern when it comes to the return to in-person schooling is the lack of comprehensive coronavirus case reporting. School cases are currently being hidden by a lack of reporting and a lack of clear reporting guidelines. Iowa does not maintain a statewide database of coronavirus cases among school populations and does not mandate that public K-12 schools disclose their coronavirus case numbers. Each district is allowed to choose how much—or how little—data to share, as well as when and how they share it. Even when schools do report numbers, they are often able to hide in loopholes, or update so infrequently it is impossible to truly understand how COVID-19 is affecting the population.

As it stands, efforts to track the spread of coronavirus in schools are being led by independent citizen scientists. The Iowa COVID-19 Tracker is an effort led by Sara Anne Willette, who has created a dedicated lab for the purpose of collecting and sharing Iowa case data, including data on Iowa schools.

This presentation details my internship with the Tracker, where I assisted with collecting data from schools and wrote a policy brief detailing the current Iowa reporting practices. I found how schools exploit loopholes to hide case data, and identified the best practices for school case reporting. I demonstrated how the Tracker collects information, explained the reporting guidelines issued by the state of Iowa, and analyzed how federal policies such as HIPAA and FERPA affect how schools disclose data. In addition, I share examples of "good" school reporting dashboards and "bad" dashboards, and discuss the optimal way to report cases.

Lilian Heinzel, '22
Biology
Marty Condon

Neonicotinoid Contamination in Northern Leopard Frog Brains

The widely practiced agricultural system of tile drainage may have a negative impact on non-target organisms like Northern Leopard Frogs (*Lithobates pipiens*) in the Prairie Pothole Region of South Dakota. Other high-concern non-target organisms are honey bees and humans. Farm crops are sprayed with an insecticide called neonicotinoids that dissolve well in water. One neonicotinoid is imidacloprid. Imidacloprid has been found in fish brains (Iturburu et al., 2017). Amphibians have extremely absorbent skin (Lanctot et al., 2017). That could make leopard frogs an indicator of how much imidacloprid is in wetlands. Our study exposes 50 *L. pipiens* collected from Wetland Production Areas in Eastern South Dakota to 0, 0.1, 5.0, and 10.0 μg/L (μ is parts per billion) of imidacloprid over a 21-day testing period in groups of 10. After the testing period, we will collect the frogs' brains and send them to the University of North Dakota for analysis.

Maryellen Hinken, '22 **Albuquerque, NM**
Ariana Ramirez, '22 **Dallas, TX**
Art & Art History
Khristin Landry-Montes

Developing Sustainable and Collaborative Educational Curriculum in Maya Villages, Data from the Yucatec Cenotes Project

In the karst landscape of Yucatán, Mexico, thousands of sinkholes provide access to fresh water. These features, called cenotes in Spanish and ts'ono'ot in Yucatec Maya, range from subterranean caverns to open-air sinkholes. Their significance as water sources were conceived by the ancestral Maya as portals to the underworld and as the abode of rain deities. Today, many cenotes are used for tourism and remain culturally important to the Maya. Despite their economic and cultural roles, cenotes are increasingly endangered by contamination. In 2018, InHerit: Indigenous Heritage Passed to Present, at the University of North Carolina at Chapel Hill, collaborated with students and faculty at the Universidad de Oriente in Valladolid, Yucatán, along with teachers at nine public middle schools in Maya communities, to develop a sustainable experiential education curriculum related to sinkhole conservation, water quality monitoring, and cultural heritage. Critical to this process was the participation of Maya middle school students who undertook both preliminary and post-surveys. The preliminary surveys were completed prior to the project's commencement and assessed students' beginning knowledge of cenotes. Post-surveys concluded the project and were used to assess students' understanding of, and concern for, cenotes after the project ended. Four Cornell College students took part in the new Ingenuity curriculum to code, organize, and interpret the data collected from these surveys. Information from the surveys tell us much about the cultural and environmental importance of cenotes in Maya communities today, while simultaneously highlighting what can be done, from an indigenous perspective, to save them.

Erin Hosto, '21
Environmental Studies

LaMoille, IL
Tammy Mildenstein

A Compositional Analysis of the Vegetative Habitat Selected by the Mariana Fruit Bat (*Pteropus mariannus*)

Additional Author: Tammy Mildenstein

The Mariana fruit bat, *Pteropus mariannus*, called fanihi in the local CHamoru language, is an endangered species found exclusively in the Mariana Archipelago. The remoteness of these islands makes *fanihi* vulnerable to extreme population fluctuation. Habitat loss due to anthropogenic or invasive species disturbance, as well as hunting, typhoons, volcanic eruptions, and other stochastic events exacerbates the risk of population decline. Fruit bat population is limited by habitat availability, yet little research has been done on preferred habitat. Rota is one of the last islands in the *fanihi*'s endemic Marianas that sustains a suitable environment for large bat populations. The local government (Rota's Division of Fish and Wildlife) used GPS tags to track *fanihi* foraging behavior and identify the vegetation components of bat-visited sites around Rota. I analyzed vegetation data on different scales, starting with a broad landscape comparison between forested and non-forested areas, then descending to comparisons between habitats and vegetation composition of each coordinate location. Of the six bats tracked in this study, five preferred evergreen forest habitats--mainly locations with greater vegetational component and diversity. Of the eleven habitat patches the bats used for foraging, seven were evergreen forest, and only one bat exclusively visited Sabana habitat, according to the available GPS data. *Ficus spp.* were found to be the most preferred food source, selected 71.1% higher than expected based on tree density data. *Pananus tectorius*, a species commonly found in the Sabana, was found to be utilized after a typhoon devastated more than 95% of the trees on Rota, leaving bats with little food. Though *P. tectorius* was found to be a food source not preferred by bats, it was an easy and readily available resource for malnourished *fanihi*. Results from this study provide habitat composition data for managers and could guide habitat restoration efforts. This project's results also provide a baseline for comparison of fruit bat habitat among the other islands in the Mariana Archipelago where this endangered species is less studied, yet where habitat is necessary to support a stable metapopulation.

Kevin Kerner, '21
Psychology
Steven Neese

Transgender Community and the Field of Social Work: Reviewing and Discussing Current Social Work Approaches

Within research intended to address and develop therapeutic strategies and treatment programs for at-risk communities, transgender communities have often been disregarded. There are disappointingly few studies intended to develop specific programs for the community in clinical and social work environments, and rather than receiving specific clinical attention, something that is direly needed in the current social climate, transgender communities are instead reduced to an ancillary recipient of potential evidence-based strategies. Furthermore, many studies are often biased or unreliable in reporting or data analysis, and scientific validity is jeopardized as a result.

While these concerns are troubling enough, an additional consideration that further compounds the inadequate treatment transgender communities receive in clinical and social work practices is the current state of mental health coverage availability. Oftentimes, hostile provider environments contribute to significant discomfort during practice, and within the healthcare system itself, there is a serious shortage of adequate, readily available, mental health services to serve communities. Therefore, this presentation reviews the current body of literature pertaining to the transgender community's relationship with clinical and social work practices, including an overview of public forms of discrimination, current responses developed by the field of social work, and potential evidence-based solutions for the field to assist the community in any way possible. Because of the significant lack of research related to solutions, directions for future research are also discussed.

Paige Klug, '21 **Huntingdon, PA**
Geology *Emily Walsh*

Modeling the Pressure and Temperature Conditions in the Seve Nappe Complex, Västerbotten, Sweden

In the Seve Nappe Complex (SNC) of the Scandinavian Caledonides, evidence of ultrahigh-pressure (UHP) metamorphism has been recently recognized on the land surface. UHP metamorphism occurs when continental crust is subducted into the mantle and experiences conditions greater than 600°C and 2.8 GPa in pressure. While UHP metamorphism is not a rare occurrence, it is unique to find evidence on the land surface, because it means that the rock was subducted to UHP conditions (>90 km depth) and then exhumed back to the surface. Thus, by studying UHP metamorphism, we can more comprehensively understand the processes of subduction and exhumation. Evidence for UHP metamorphism has been found in two separate parts of the SNC. The older (490-480 Ma) northern region (Norbotton) and younger (~460 Ma) southern region (Jämtland) are well studied and have exhibited evidence of UHP metamorphism; however, it is unclear as to whether the UHP metamorphism of the two areas was due to one tectonic event that slowly transitioned southward, or whether two separate tectonic events occurred. The key to the tectonic history of the SNC is in Västerbotten, an area between Norbotton and Jämtland that is not as well studied or understood.

Our garnet-kyanite-biotite schist is from central Västerbotten and is farther north than has been previously studied. Monazite within the sample have been dated to 468.64 ± 0.49 Ma (Walsh et al., 2020)—notably older than Jämtland but younger than Norbotten ages. The purpose of this study is to analyze the pressure–temperature conditions of the rock and create a pressure–temperature path that helps reconstruct the plate tectonic mechanisms that produced the UHP metamorphic events. To conduct this analysis, I used the program Perple_X to create a pressure-temperature diagram (pseudosection) that predicts the equilibrium mineral assemblages for the sample's whole rock geochemistry. I used X-ray fluorescence (XRF) spectrometry data, analyzed a rock thin section of our sample for the modal percentage of each mineral, and used the internally consistent thermodynamic database to produce a series of pseudosections. I chose solution (mixing) models that are consistent with our mineral compositions and published literature to draw mineral composition contours within the pseudosections, and used these to model the pressure and temperature path of our sample.

Elizabeth Koetz, '21 **Minneapolis, MN**
Chemistry *Cynthia Strong*

Analyzing Mineral and Protein Content in the Fruit-Based Diet of the Mariana Flying Fox

The Mariana Flying Fox, *Pteropus mariannus*, is classified as an endangered species by the International Union for Conservation of Nature, and habitat restoration is a part of preservation efforts. For reforestation efforts, plants that have higher concentrations of protein and minerals are necessary to ensure the bats have a balanced diet. Research to find which of the fruits are most nutritionally beneficial and whether those fruits are native was conducted to provide context for those reforestation efforts. Nineteen fruits from Rota, one of the islands where Pteropus mariannus is found, were analyzed for 8 minerals by dry ashing and optical emission spectrometry. Protein in the fruits was also analyzed using a spectrophotometric method. Here we show that *Dendrocnide latifolia* had the highest of all mineral concentrations except for potassium, of which *Hernandia sonora* had the highest, and *Annona muricata* had the highest protein concentration, although it does have relatively low mineral concentrations. Based on the results, the average concentration of minerals and protein in native plants seem to be higher than those of cultivated and non-native plants, though there does not seem to be a correlation between levels of protein and minerals. Based on the data, tentative recommendations for reforestation would focus on native plants, specifically *Dendrocnide latifolia*, *Hernandia sonora*, and *Annona muricata.*

Elizabeth Koetz, '21
Theatre & Dance

Minneapolis, MN
Scott Olinger

Lighting Design as Performance; Using Lights to Evoke Emotion in an Audience

Lighting design is inherently flexible, allowing a wide range of storytelling and emoting. As much as an actor could be expected to range from comedic to dramatic arts, lighting has the potential to evoke a variety of emotions within an audience. Architectural lighting design is particularly significant to popular music concerts, creating ephemeral places that change with the calling of a cue. Lighting design is as flexible as musical genres, as this project will demonstrate. To show this, lights were designed and programmed for a music concert. Five songs from varying musical genres were chosen and lights were programmed for each to help the audience engage with the materials. Songs include "Here You Come Again" (Dolly Parton), "Live and Let Die" (Guns N' Roses), "What a Wonderful World" (Louis Armstrong), "I Am What I Am" (Jerry Herman, Harvey Fiestein), and "Scheherazade" (Nikolai Rimsky-Korsakov). While usually a live performance art form, provided visuals are film from both the physical performance and a 3D-imaged virtual performance.

Justyna Kruczalak, '22
Biology

Wheaton, IL
Isaac Winkler

Gene Expression in *Blepharoneura*, Regarding the Functions of Melanization, Encapsulation, and the Phenoloxidase Pathway

More than 60 species of *Blepharoneura* fruit flies (Diptera: Tephritidae) feed on flowers or seeds of vines belonging to Gurania and related genera (Cucurbitaceae). Parasitoid wasps in two families, Braconidae and Figitidae, attack *Blepharoneura* by inserting eggs into fly larvae. The normal fly immune response is to encapsulate the egg by surrounding it with specialized immune cells (lamellocytes), then harden (melanize) this capsule by generating toxic, highly reactive compounds that link to form melanin. If the fly's immune system is not successful in killing the wasp egg, a wasp will develop and emerge from the fly puparium, killing the pupal fly. Previous research suggested that some Blepharoneura species are much more vulnerable to parasitoids than others. This difference may be due in part to differential expression of genes that are responsible for encapsulation and melanization.

Several hundred genes are known to be involved in the insect immune response. After reading scientific literature about the defense mechanism of the fruit fly (*Drosophila*) against parasitoid wasps, we chose 22 representative immune genes (atilla, proPO-A1, pxn, pvr, nimrod, cg8745, cg14527, cg14257, cg10962, nepl3, path, tig, cg1208, cg4259, sid, magi, cg6300690, karl, fat-spondin, myospheroid, hemolectin, rac1) that are thought to be essential for successfully terminating parasitoid eggs. Homologues of these genes were identified in a larger RNA expression dataset from 65 parasitized and unparasitized pupae of six different *Blepharoneura* species collected in French Guiana.

We hypothesize that *Blepharoneura* species with higher rates of parasitism will have lower baseline expression levels of some defense-related genes, and that successful parasitoids will repress expression of some fly immune genes. Our results indicate few significant differences between expression levels of parasitized versus unparasitized fly pupae. However *Blepharoneura sp.* 30 flies parasitized by *Bellopius* did show a higher level of gene expression for the rac1 and path genes. In contrast, many genes showed differences in expression levels between species, even in unparasitized flies. The largest expression difference was seen in the prophenoloxidase A1 gene, which codes for the enzyme directly responsible for melanization of parasitoid eggs.

Justyna Kruczalak, '22 **Wheaton, IL**
Ciera Davis, '22 **Nassau, Bahamas**
Biology *Tammy Mildenstein*

Invertebrate Biodiversity in Benthic Zones of Streams

The majority of animals on earth are invertebrates. Invertebrates are vital in aquatic ecosystems. They are key elements in the food chain and can help us assess water quality. They break down material from primary production such as algae and cyanobacteria. They also aid in nutrient cycling and decomposition. Our goal was to measure the biodiversity of invertebrates in a stream during the winter season by calculating species richness, species abundance, and species evenness.

Measures of biodiversity are used by ecologists to assess the health of an ecosystem. Diverse communities are believed to be more stable than communities which have less variety of organisms. At the Mount Vernon Nature Park, three sections of Hahn Creek were chosen for sampling benthic invertebrates: one with a gravel bottom, one with a muddy bottom, and the third representing a transition between the two. Samples were collected from the benthic zone of each of the chosen environments in the stream. We sorted morphospecies of sampled invertebrates, identified them to the family level, and estimated the abundance of each in the sample. Our results show that all three communities share certain species, but have other differentiating species. Our results also suggest that a mixed (edge) habitat may have higher biodiversity than inner habitats.

John Linderman, '22 **Lincoln, NE**
Chemistry *Craig Teague*

Role of the Density Functional in Graphene-Based Carbon Dioxide Capture Systems

Climate change due to carbon dioxide emissions will be one of the largest challenges humans will face in this century. Carbon dioxide capture introduces the possibility to drastically reduce carbon dioxide content in the atmosphere. Our research is focused on using computational chemistry to learn more about CO_2 capture. Understanding interactions between CO_2 and capture molecules on a molecular level can help engineers design more effective capture systems. Computational chemistry can provide understanding of fundamental molecular parameters key to CO_2 capture. The previous systems studied with computational chemistry include ionic liquids and functionalized graphene analogs. We focused on functionalized graphene analogs in our research. Graphene-based CO_2 capture is promising for multiple reasons including, but not limited to, the versatility of graphene as a material when designing capture systems. Having a solid capture system removes a lot of the issues that ionic liquid capture systems have.

Our research was conducted using the computational engine Q-Chem and a high performance computing cluster. We used the web-based interface WebMO to build molecules and we calculated the lowest energy geometries of functionalized graphene analogs and graphene-CO_2 complexes using density functional theory. We attempt to establish a relationship between the lowest energy geometry of a graphene-CO_2 complex and the partial charge of the anion in the functionalized graphene analog. Our research also focuses on comparing the different exchange-correlation energy approximation functionals that exist in density functional theory. These functionals vary in effectiveness for different molecular systems, so we attempted to find which functional would be best suited for our research.

Sydney Meeker, '21 **Mount Vernon, IA**
Biochemistry & Molecular Biology *Barbara Christie-Pope*

Investigating Ion Channels in Models of Parkinson's Disease

Magnesium is an essential nutrient involved in the regulation of protein synthesis, muscle and nerve function, and blood pressure regulation. Magnesium can also function to block the death of dopamine neurons caused by neurotoxins. Dysregulation of magnesium may be involved in Parkinson's disease (PD), which involves the loss of dopaminergic neurons. Several studies have indicated low levels of magnesium in the brains of PD patients.

Magnesium content in the body is regulated by many genes including slc41a1 (magnesium exporter) and trpm7 (ion channel), which may play a role in neurodegenerative disorders. Loss of slc41a1 should result in a higher level of magnesium since magnesium is unable to exit the cell. In addition, the loss of trpm7, which plays a role in allowing magnesium into the cell, results in a movement disorder in zebrafish similar to that observed in PD patients. We hypothesized that the loss of slc41a1 would result in high magnesium levels, thereby improving the movement disorder seen in zebrafish lacking trpm7. We also hypothesized that the removal of slc41a1 in mammalian cells would protect the cells and limit cell death due to neurotoxins that target dopaminergic neurons. To test these hypotheses, zebrafish embryos and cell cultures of dopamine-containing neurons were used as models. Zebrafish mutants were produced by deleting slc41a1 and trpm7. Motility assays were performed to determine the effects on movement, and tyrosine hydroxylase immunohistochemistry was used to indicate the presence of dopamine-containing neurons. Whole-cell magnesium levels were measured in mammalian cells after expression of slc41a1was blocked.

Our research demonstrated that blockage of slc41a1 resulted in decreased levels of magnesium in the dopaminergic cell line. Deletion of slc41a1 was confirmed in zebrafish embryos. Future studies will need to be done in order to determine if slc41a1 zebrafish mutants are sensitized to or protected from specific dopaminergic neurotoxins by examining behavior. Further investigation must also be done to determine if a mammalian cell line of dopaminergic neurons exhibit protection against dopaminergic neurotoxins.

Evan Mills, '21 **Orange City, IA**
Physics & Engineering *Kara Beauchamp*

Physics Labs Best Practices

Many rising science educators would likely agree that labs are an essential component of a science course, but do we all agree on their primary purpose? There are a variety of pedagogical goals for lab instruction, but do lab activities accomplish some of those goals more effectively than others? This research project sought to synthesize a variety of ideas from a handful of sources including *Modeling Physics and ISLE Labs*. Drawing from successful existing college-level lab instruction models, published research-based studies, and interviews with current practicing high school and middle school science teachers, many of the common threads for best practices in lab instruction were identified and documented. Concepts were taken from this investigation and demonstrated through a lab-based unit plan for a theoretical high school physics class. This research project also led to the development of *Productive Collaboration*, a plan to help physics teachers scaffold group dynamics for their lab activities. While the final unit plan has not been tested in a research setting yet, it provides a concrete example of how many of these best practices that are research-validated may be applied in a high school classroom.

Azurite Montgomery, '21 **Minneapolis, MN**
Art & Art History *Christina Penn-Goetsch*

The White Supremacist Coup on the Capitol Was Patriotic

On January 6th, 2021, pro-Trump protestors stormed the U.S. Capitol with Confederate flags and alt-right symbols. They congregated in the Rotunda, a space which is a nexus of American values and the symbolic heart of the U.S.A. Senate Minority Leader Chuck Schumer announced that the "[t]emple to democracy was desecrated, its windows smashed, [and] our offices vandalized." News stations reported the assault as one on our democratic values. Nevertheless, the subject matter of the sculpture and paintings that appear in the Rotunda only intensify the place of a violent white masculinist hegemony. I will argue that, rather than being an unprecedented attack on the American nation's "Temple of Democracy," as the media has framed it, the events of January 6th occurred in a context that has traditionally celebrated white supremacy as an American ideal.

The Neoclassical art and architecture of the Capitol, specifically Rotunda, affirms white supremacist ideologies. In a PAFA talk from January 26th, "Reframing the Legacy of the Capitol," Dr. Christian Ayne Crouch, Dr. Jacqueline Francis, Dr. Vivien Green Fryd, and Dr. Amy Werbel all address the imperialist and white dominant ideologies of the U.S. through analysis of the art of the Capitol. Continually referenced through these talks is the idea that both the Capitol and white supremacists glorify and benefit from genocide. I will refine these ideas by analyzing the space and art of the Rotunda in regards to identity and empire. The identity-building process of America, identified with that of empire, will be compared to the identity-building symbols of the white supremacists, who tout a pure racial state. The symbols of the eagle and the fasces, as well as the type of historical figures honored in the central space of the Rotunda, are symbols which continue to bear echoes of fascist regimes, genocidal appropriation of native people's symbols, and promote hyper-masculinity.

Alex Nelson, '21 **Stillwater, MN**
Philosophy and Spanish *Megan Altman and Michael Mosier*

Home, Belonging, and Latin America

The concepts of home and belonging are key aspects of philosophical and political thought; however, such concepts are regularly taken for granted or overlooked. Many systems of thought do not deeply consider what it means to be at home and belong. Traditional Marxism, for instance, tends to ignore questions about being at home in the world. These systems often ignore how existing as an outsider, an exile, an immigrant, or an Other shapes one's very Being. In my research, I analyze this way of Being, via Heidegger's phenomenology of anxiety, not belonging, and diaspora (the latter two I group together under the term "displacement"). Specifically, I argue that traditional Marxist post-revolutionary notions of home and belonging are problematic. I further demonstrate that Latina feminist phemomenology enahnces the traditonal Marxist view of home and belonging and provides new avenues of investigation. To do so, I analyze both literature and philosophy while emphasizing Latin American and Latina feminist thought. I explain accounts of displacement from philosophers Mariana Ortega, María Lugones, and Gloria Anzaldúa. These philosophers describe and explore the anxiety-ridden experiences of not-being-at-home. I then explain that a solution to the ontological anxiety of such experiences can be sought through the concept of home. To this end, I offer my own account of home, drawn from an analysis of Ortega and Lugones. I then return to traditional Marxism to show the necessity of updating ideas about Being-at-home and belonging. Lastly, this paper engages with the decolonization of philosophical inquiry by emphasizing voices and experiences from the liminal space of being-in-between. Such voices and experiences can disclose aspects of Being and home that previously were marginalized or unavailable and return us to the need to expand traditional thought concerning Being-at-home and belonging.

Solomon Ogbevire, ’21 **Rockford, IL**
Madison Charles, '20
Biology *Craig Tepper*

Symbiotic Algae in Marine Snails: Why?

Symbiodinium is a photosynthetic algae that is capable of developing a symbiotic relationship with multiple species of marine organisms (coral, jellyfish, sponges, and flatworms). Most research has focused primarily on the relationship of *Symbiodinium* with their coral hosts. Surprisingly, studies have shown that the symbiont is also present within the cells of species of shelled snails, specifically *Strombus gigas*, or queen conch. The symbiotic relationship has been found to be beneficial in queen conch larvae where the photosynthetic symbiont supplies nutrients to the host. However, the photosynthetic algae continue to be present in the shelled, adult stage of the queen conch. This poses the question of how the symbiont is able to survive and whether the relationship has gone from mutually beneficial to heterotrophic or parasitic.

We are investigating the presence of *Symbiodinium* in photonegative shelled nerite snails. Nerites are very common and typically found in the intertidal zones of the Caribbean. The nerites we examined contained *Symbiodinium* (N= 22). Next, we decided to investigate whether the *Symbiodinium* found in nerite snails were photosynthetically active. We examined the expression of two photosynthetic-specific genes located in the photosystems of the symbiont’s chloroplast. These genes code for proteins found in photosystem I and II are essential for converting light energy into chemical energy during photosynthesis. Our results indicate that the gene coding for the protein in photosystem II was expressed but we were unable to show any expressions of the gene coding for the protein in photosystem I. We now plan to test the expression of other photosynthetic-specific genes to verify whether the symbiont is making proteins for photosynthesis. We are also exploring mechanisms to measure photosynthetic products produced by *Symbiodinium*. Our overall goal is to determine if the relationship between *Symbiodinium* and nerites snails is mutually beneficial.

Jack Prebish, '21
Chemistry

Northbrook, IL
Craig Teague

Capture of CO_2 Using Functionalized Graphene: The Role of Hydrogen Transfer

With global climate change becoming a more present threat to natural environments, a lot of research is focused on reducing the CO_2 released into the atmosphere. One promising realm of research is looking at using ions to bind and capture CO_2. While technology using room temperature ionic liquids is promising, it has the drawback of becoming viscous and less effective as it captures more CO_2. To circumvent this issue, many researchers are looking at attaching ions to graphene surfaces. This research seeks to examine a possible hydrogen transfer from the graphene to the CO_2. To do this, the functionalized graphene is modeled in QChem through WebMO. Pyrene molecules were functionalized with either an oxygen or nitrogen anion, in the cis or trans formation. While all forms have been previously shown to capture CO_2, only the cis nitrogen formation showed hydrogen transfer to the CO_2. Calculations were run using Density Functional Theory and the B3LYP functional. For geometry optimizations the basis set 6-311+G(d,p) was used, and the basis set 6-31G(d) was used for vibrational frequencies.

From this we have found that the cis nitrogen formation is the best at capturing CO_2 and appears to have a hydrogen transferring from the pyrene to the CO_2. Evidence for the hydrogen transfer comes in the form of bond length and dihedral angle of the pyrene. The cis nitrogen formation shows a distance between the hydrogen and carbon that suggests that the hydrogen is no longer bonded. The dihedral angle supports this as graphene is a flat molecule, which deviates when it is functionalized. By removing the hydrogen, the pyrene returns to a flatter state, which is seen in the cis nitrogen formation only. While the available evidence points to the structures shown and the detachment of the hydrogen in the cis nitrogen structure, the molecules are in their lowest energy conformation. Despite numerous attempts, the vibrational frequencies continue to produce imaginary modes. We were also unable to run any successful molecular orbital calculations. This leaves the door open for future research in further verifying these structures, as well as casting doubt on the validity of these structures.

Maura Quinn '21
Music

Rome, GA
James Martin

Pelléas et Mélisande: Two Divergent Paths

In 1902, Arnold Schoenberg and Claude Debussy both premiered musical adaptations of Maurice Maeterlink's *Pelléas et Mélisande*. Though the works were based on the same source material, they are strikingly different, not just in genre but in musical content. Schoenberg wrote a symphonic poem based on the story—this was a new, Romantic genre, but his harmonies were still fairly conventional. Debussy wrote an opera—an old and widely respected genre, but his musical (and theatrical) style was innovative, paving the way for the rejection of tonality by some of the twentieth century's most significant composers.

These two adaptations represent the two approaches taken by composers as they entered the twentieth century. The shared source material and identical premier dates make contrasting these works particularly effective. Conservatives, represented by Schoenberg's symphonic poem, were intentionally conscious of connecting the evolution of their musical style with their predecessors. Though it is surprising that Schoenberg is the conservative, given his reputation as a radical ultra-progressive, in retrospect the conservative elements to his thinking are evident. Progressives, represented by Debussy's opera, eschewed convention and history altogether to start anew; they believed that music could just be beautiful without the sense of tonal destination found in the music of centuries past. The sheer beauty of Debussy's music seduces the listener, camouflaging the radical aspects of his work. I will examine the relative histories and immediate futures of symphonic poems and operas in order to contextualize the two works, then examine the form and structure of the works, as well as the harmonic features. I argue that the two composers employed these different approaches because they had different goals for what music should be. Ultimately, the two compositional approaches and corresponding musical philosophies lead to the twentieth century seeing the most diverse music ever composed.

Maura Quinn '21
Music

Rome, GA
Jama Stilwell

Music for the Mind and Soul: "Plus bele que flor" in the La Clayette Manuscript

The thirteenth century was a time of change for France. Society took on new shapes, with increasing urban development and new class stratifications, and music changed along with it. The motet exemplifies many of these changes: a genre of music developed by and for an emerging class of educated ecclesiastic elites. The motet was considered beautiful enough to stand on purely aesthetic merits; however, it had deeper value: It was believed that listening to and studying motets developed many of the skills prized among the educated upper class and could even bring one closer to God.

The motet "Plus bele que flor" survives in two manuscripts. One is the La Clayette manuscript, a collection of miscellaneous works that include 55 motets amidst a variety of sacred and secular works, such as saints' lives, love poetry, historical records, a romance, and a bestiary. "Plus bele que flor" is a particularly valuable representative of the La Clayette manuscript because it crosses the line between sacred and secular. Analyzing the motet in the context of the manuscript reveals how the motet was used and how it was considered in the thirteenth century. It also gives insight to who was able to listen and study the motet. I argue that its inclusion alongside the other works shows that the motet was used for practical purposes (to bring one closer to God as well as to one's peers), and that the motet was considered valuable for its ability to achieve those ends.

Ariana Ramirez, '22
Art & Art History

Dallas, TX
Khristin Landry-Montes

Shaft Tomb Figures of Ancient West Mexico Elite

Ancient civilizations in West Mexico have often been overlooked in academic research. This region of Mexico has a wide range of shaft tombs that are complex burial sites, signifying the hierarchy of the time. Most of these tombs have been found in Nayarit, Jalisco, Colima, and parts of Michoacán. Focusing on a ceramic funerary figure found in shaft tombs in the Ameca-Etzatlán region of Jalisco, characteristics of the people that were once there may be described. The Seated Ballplayer figure is dated between 300 B.C. and 200 C.E. and was found among a variety of other objects surrounding skeletons in the tomb. Its identification as a ballplayer comes from the representation of a rubber ball being held by the seated figure. The ballgame was played by many civilizations in Mesoamerica, often representing the game through an abundance of ceramic works with athletes wearing ballgame equipment. Given the uniqueness of the Seated Ballplayer's decoration, this object was meant to honor a man of higher status who was a skilled ballplayer. Based on studies from Richard Townsend, these figures reflect the identity of the skeleton nearby it. From Christopher Beekman and Robert Pickering's findings, skeletons with hip bone damage were found to have a variation of a ballplayer figure at their feet. Understanding that the ballgame sport often causes such damage, it is not implausible to assume that the ceramic figure represents an aspect of the skeleton's life. Beekman and Pickering also found that jewelry depicted on the funerary figures around a skeleton matched jewelry found on the same parts of the paired body. According to many scholars, jewelry is often a signifier of wealth in ancient civilizations. From these discoveries, this indicates that shaft tombs were reserved for people of elite status, as they were buried with a range of objects. Through consistent research of West Mexico, we can piece together a more complete history of Mexico.

Armani Rogers, '21 **Chicago, IL**
Art & Art History *Christina Penn-Goetsch*

Art as the Experience: George Floyd Square

I took a trip to Minneapolis, Minnesota to document street art surrounding the mural of George Floyd and the BLM Movement in a Time of Protest. The mural was designed and completed by Cadex Herrera and Xena Goldman. Others, including Greta McLain, Niko Alexander, and Pablo Hernandez, also were responsible for executing the painting located outside Cup Foods in what is now known as George Floyd Square. The catalyst for this work and the protests that took place in the summer of 2020 was the fatal encounter between a man by the name of George Floyd and law enforcement on May 25, 2020. A video surfaced showing his execution, and people immediately called for the arrest of all officers involved. In response, communities all around the world broke out in protest. There was tension everywhere, and I went to the heart of it all in Minneapolis last fall where this mural, as well as many other works and objects, create what Erika Doss might call a "temporary memorial."

When I looked closely at the work, I was led to see that the mural was just one piece in a larger project that is characteristic of public art. The work is site- and context-specific. To take the mural away from its intended location, even for the sake of preservation, affects the authenticity or power of the art. This memorial was intended to be a temporary one, and I feel as though it creates a preservation paradox in the context of infringing on the core values of street art. In my heart I just felt like there was a sort of wrongdoing in taking street art and repurposing it later in commemoration because it goes against the unspoken rules/bounds of street art. Though the act of preservation is usually held in high praise and authority, I think street art should run its course and naturally die where it stands to live out its purpose. It infringes on the experience, which I must say is the "art" in this case of art. Taking the works and renewing context make the experience artificial. It becomes an echo of the original.

Mara Schwiesow, '21 **Alamosa, CO**
Biochemistry & Molecular Biology *Craig Tepper*

Fire Coral Under Fire: Can Algae Save Coral from Global Warming?

Coral reefs worldwide have experienced large declines in coral cover and community composition as a result of elevated sea surface temperatures due to global warming. The destruction of coral reefs raises concerns about their potential to support one of the most diverse ecosystems on the planet. The crucial symbiotic relationship between coral and Symbiodinium is threatened by rising ocean temperatures causing coral to expel their symbionts and bleach. Hoegh-Guldberg estimated coral reefs will no longer exist by 2040.

Our model system to study susceptibility and resistance to coral bleaching is the symbiotic relationship between millepores (fire coral) and their algal symbionts. Our goal is to determine whether certain clades of symbionts offer more resistance to bleaching. Our two study sites are San Salvador, The Bahamas (cooler ocean temperatures) and South Water Caye, Belize (warmer ocean temperatures).

Millepores examined from The Bahamas contain Symbiodinium that are exclusively clade B dominant (N=80). In Belize, millepores contain both clade A (N=60) and clade B (N=35) as their dominant symbionts. Millepores that are clade B dominant are showing signs of bleaching, while clade A dominant millepores appear healthy. Millepores examined from deeper reefs in Belize (50-80 feet), where the sea temperature is cooler, tend to be clade B dominant (N=14/18). Our findings support the controversial Adaptive Bleaching Hypothesis, which states coral are capable of shuffling their symbionts as a result of thermal stress.

Blake Thornton, '22 **Avoca, IA**
Art & Art History and Archaeology *Khristin Landry-Montes*

Stela C, Tres Zapotes: The Cross Influence Between the Epi-Olmec and the Pre-Classic Highland and Piedmont Maya, and How that Shaped Classic Maya Culture

The Pre-columbian cultural area known as Mesoamerica, comprising modern day Mexico, Guatemala, Honduras, El Salvador, and Belize was home to some of the most complex societies in the New World. Many of these societies are well known in popular culture today, such as the Olmec, Maya, and Aztec. Less explored, however, are the societies that existed between the rise and fall of those major cultures. This research examines the achievements of one such group, called the "Epi-Olmec." The Epi-Olmec civilization began after the fall of the major Olmec sites of San Lorenzo and La Venta around BCE 500-400. During this collapse, the smaller villages began to see a major population boom, as is evidenced in the site's archaeological record.

In terms of archaeological, epigraphical, and art historical study, Epi-Olmec culture has seen significantly less attention than the Olmec and Maya. However, as demonstrated here, the advancements from this culture reflect key innovations in terms of writing, art, and social structure. Rather than representing a "Dark Age" between two major cultures (Olmec and Maya), the Epi-Olmec represents a renaissance period during which time major advancements were being invented and nurtured. One such advancement is portrait stelae, an invention commonly associated with the Late Classic Maya. Portrait stelae are stone monuments depicting the image of a ruler, and containing dynastic histories of the ruler carved into them.

Through research of the Epi-Olmec monument Stela C, from the site of Tres Zapotes, I (1) interpret the carvings on the front face of the monument, (2) explain the meaning behind those carvings and how they may have been used to usher in a new political system, and (3) explore the foundation of the earliest known MesoAmerican script and the influence it might have had on the later Maya script and portrait stelae tradition.

Carson Wiggins, '23
Geology

Carlisle, OH
Rhawn Denniston

A Stalagmite Paleoclimate Reconstruction of Indian Summer Monsoon Variability from 1,400 to 4,000 Years Ago from Central Nepal

The Indian Summer Monsoon (ISM) contributes nearly 80% of India and Nepal's total annual precipitation. Monsoonal failure can lead to catastrophic agricultural collapse, while particularly wet monsoon seasons can induce severe flooding. For these reasons, it is vital that the scientific community develop a comprehensive understanding of the drivers of ISM variability, but direct observation of ISM rainfall is too short to capture the full range of forcings that influence the monsoon. In this study, a preliminary monsoon rainfall record spanning the last 4,000 years was developed using stalagmite Gu-1 from Gupteswar cave, Pokhara Valley, central Nepal, in order to shed light on multidecadal to centennial scale variability in the ISM. Stalagmites are composed of calcium carbonate ($CaCO_3$), and stable isotopes (atoms of the same element with different masses) of carbon and oxygen in stalagmites are sensitive to changes in rainfall. Both carbon isotope ratios ($^{13}C/^{12}C$) and oxygen isotope ratios ($^{18}O/^{16}O$) decrease as rainfall increases with carbon responding to changes in out-gassing of CO_2 in voids above the cave and oxygen reflecting the "amount effect." Gu-1 was sampled at 1 mm intervals along the central growth axis, and four uranium-thorium radiometric dates (with 2 standard deviation errors of ±150-800 yr) were used to define the chronology.

Gu-1 grew from 4,000-1,400 years ago, and the carbon and oxygen isotopic time series reveal the presence of multidecadal wet and dry periods. For example, episodes of enhanced ISM rainfall occurred from 3,600-3,550 and 2,400-2,300 years ago while dry periods spanned 3,700-3,600 and 2,300-2,250 years ago. The Gu-1 record is structurally similar to rainfall anomalies identified in other stalagmite paleo-monsoon reconstructions from across the ISM region. Researchers have suggested that such multidecadal oscillations in the ISM may be linked with climate phenomena such as the El Niño-Southern Oscillation, Indian Ocean Dipole, or Atlantic Multidecadal Oscillation. Studies such as this one help fill spatial and temporal gaps that allow us to assess what drove changes in past ISM rainfall and thus may help us understand how the ISM will respond to future warming.

Ryan Williams, '21
Russian Studies

Mount Vernon, IA
Lynne Ikach

Privatization in Russia: Societal, Economical, and Long-Term Impacts

Through the entire decade of the 1990's, the Russian Federation was in a state of economic instability, caused in part by the aggressive economic privatization reforms after the collapse of the Soviet Union, as well as the collapse of the Soviet Union itself. While the new privatization reforms aimed to distribute wealth back to the people of Russia through the use of voucher checks, very few Russians took advantage of these voucher checks as they had larger issues relating to unemployment, starvation, and lack of healthcare at the forefront of their concerns. These larger concerns, along with the general lack of understanding amongst the Russian population of privatized economies, led to the Russian people disregarding the value that these checks potentially had in the future. Rather than creating a strong middle class, as intended, the economic reforms paved the way for a new class of Russian elite called the oligarchs, which not only held massive amounts of money, but also political power; this intensified the wealth gap already present in the country. This transitional point in the Russian economy left an imprint that would last for many decades. Both Russian and Western scholars have argued that the fall of the Soviet Union was inevitable; however, the methods of the reforms that were conducted (voucher checks, loans for shares, check investment funds), as well as the outcomes of these reforms,were not inevitable. The actions of those in power, the economic reformers and oligarchs, decided the course of the Russian economy, and the fate of the Russian people. What should have been a process that gave back to the hardworking Russian people became a battle of the oligarchs for the largest state enterprises and political power.

Alexis Woywod, '21
Kinesiology

Lyons, IL
Justus Hallam

How Self-Reported Physical Activity Habits and Mental Health Are Affected by a Global Pandemic

The COVID-19 pandemic has affected the world in many different ways since it began in January 2020. Two important aspects of individuals' daily lives that have been greatly impacted by the pandemic are physical activity and mental health. As gyms temporarily closed, schools and jobs moved online, and outdoor and indoor activities were being discouraged, physical activity and mental health were a need for concern. The U.S. Department of Health and Human Services (U.S. HSS) states that physical activity can help prevent chronic diseases, decrease the potential of becoming depressed, improve sleeping habits, relieve stress, and improve overall health (2017). Previous studies examined the effects of social isolation and job loss on physical activity and mental health; however, our study is the first to examine the effects of these two variables when they occur during a pandemic. A survey created through Google Forms was distributed to obtain information on the physical activity and mental health of the population during the pandemic (January 2020-June 2020). The survey was distributed through sharing the link on social media and email. The survey was open for two weeks, and at the end of the two weeks, 613 responses had been collected. The data was broken down into three categories: occupation, location, and age. For occupations, students and teachers experienced a significant drop in steps after schools began temporarily closing and lockdowns began. Stay-at-home parents experienced a significant increase in steps. Only one age group experienced an increase in steps, 65-74, while every other age group saw a decrease in steps. The data in this study can be used to give insight into groups that may need more access to resources to improve physical activity and mental health during a pandemic. To provide more accurate and inclusive data, further research needs to be done.

Cornell College Student Symposium

Inaugurated in the spring of 1997, the Cornell College Student Symposium provides an annual opportunity for undergraduate students on the Hilltop to share the fruits of their study in a forum that encourages wide community participation and attendance. Students who have done interesting and accomplished work in the setting of regular term courses or in independent research may be invited to present by faculty members or may themselves seek faculty sponsorship. Over a period of weeks beginning in the late fall, and with the assistance of their faculty sponsors, students indicate their intention to present, prepare a brief abstract of their work for inclusion in the Symposium program, and formulate the presentations themselves. The event, coordinated by the Center for Teaching & Learning, occurs in April each year.

For presenters, the Symposium offers a prime setting for refining ideas, sharpening skills, and receiving feedback from the campus community, including students and faculty members in and beyond the presenters' major programs. For attendees, the Symposium offers a rich sampling of liberal arts research, represented by the work of dozens of students, in every academic division. For the College, the Symposium offers a memorable enactment of academic community, the contemporary realization of a historic ideal.

COVER DESIGN BY MARQUIS TERRELL '17