UNDERGRADUATE RESEARCH & INTERNSHIP SYMPOSIUM

WEITZ CENTER FOR CREATIVITY COMMONS
4:30 - 6:30 PM
OCTOBER 14, 2022

www.carleton.edu/research/symposium/2022-symposium
Welcome to the 2022 Student Research and Internship Symposium at Carleton.

Today we honor the many students who have explored career paths and engaged in advanced work in their respective fields, building on the knowledge and skills they acquired throughout their work at Carleton and beyond.

Experiential learning via research, internships, and fellowships are at the heart of a Carleton education. Through their posters and oral presentations these students reveal the habits of mind that an outstanding liberal arts education provides – curiosity, adaptability, careful observation, reflection, and compelling communication. We are proud of their many accomplishments.

We also wish to acknowledge and celebrate the great diversity of experiences represented here. Staff and faculty from many different departments and programs have supervised student research and internship projects, and community members have helped students to grapple with how their knowledge, skills, and values play out in the complexity of the real-world. Taken together, the work of these students attests to the breadth of experiential learning opportunities afforded by Carleton and the many ways in which faculty and staff throughout the College inspire and support student scholarship and plant the seeds for life-long learning.

Finally, we call attention to the many significant mentoring relationships that fostered this work and were deepened as a result of it. As generations of Carleton students will attest, the opportunity to work closely with faculty and staff is among the most impactful and memorable of their experiences here. Behind each of these presentations is a faculty, staff, or community member whose guidance, encouragement and coaching enriched the education of students and inspired them to go further than they imagined they could. We are grateful for the dedication and attentiveness of all these mentors.

We invite you to engage with these students, to question them about their work and its significance to them and the world. In this way, we hope you will join them, at least briefly, on the journey they have undertaken.

Thank you for joining us for this symposium and celebration.

Michelle Mattson, Provost & Vice President for Academic Affairs

Carolyn H. Livingston, Vice President for Student Life and Dean of Students
**Marcos Acero ’25**

Major(s): Undecided  
Other Authors/Contributors: Sean Lyons ’25  
Supervisor(s) and affiliation or institution: Arjendu Pattanayak (Professor of Physics, Carleton College), Andrés Aragoneses (Professor of Physics, Eastern Washington University)

**Title: Families of Chaos: Generalized Symmetry Analysis of Ordinal Patterns**

Computed methods such as the permutation entropy and the Lyapunov exponent have been used to easily differentiate regions of chaos from those of periodicity in a dynamical system given a sequence of ordinal patterns from a time series. It has been theorized, however, that we could determine more information about a system by taking a more fundamental approach towards characterizing the dynamics using these ordinal patterns by themselves. Other work analyzing a Fisher-Shannon plane with permutation entropy as a function of a control parameter showed that there’s a universal fingerprint across maps, showing distinct regions of chaotic behavior.

We show that we can use these ordinal patterns, which we refer to as “words,” to categorize different types of chaos. Categorizing words into symmetry groups and comparing the variance of individual words from each other within these groups yields different levels of variance corresponding to these chaotic families.

This experience was funded by: Clinton Ford Fund

Presentation time: 4:30 - 5:15 p.m.  
Poster number: 1

**Collin Adams ’23**

Major(s): Biology

**Title: Investigating Hox Transcription Factor Binding in C. elegans via CRISPR/Cas9 Genome Engineering**

The nematode worm -- and common laboratory model organism -- C. elegans exists in two naturally occurring sexes: hermaphrodite and male. There are multiple sexual dimorphisms between the two sexes, including the development of neurons unique to the male worm. Among those neurons unique to the male are the CA/CP neurons in the ventral cord of the worm (like your spinal cord). Interestingly, the CA/CP neurons arise from the exact same precursor cell as another set of neurons in the hermaphrodite worm (called VCs), known as the Pn.aap neuroblast. Even though these two subsets of neurons arise from the same precursor, they take on different fates upon differentiation. As developmental biologists, we are interested in exploring the mechanisms by which this sexually dimorphic characteristic arises. My project focuses on these characteristic CP neurons of the male C. elegans worm, and the specific signals that are responsible for their differentiation.

This experience was funded by: The Rosenow Fund

Presentation time: 4:30 - 5:15 p.m.  
Poster number: 2
Amira Aladetan ’24

Major(s): Biology

Title: Follow the Science? Variation in COVID Exposure Policies among Academic Medical Center Child Care Facilities

As part of the Berman Institute of Bioethics and Department of Health Policy and Management, I worked under the mentorship of Dr. Stephanie Morain and another intern Jaschia Hall. We worked on two projects: the availability, affordability, and accessibility of childcare centers on the campuses of medical schools and what policies/procedures those specific childcare facilities affiliated are using to manage COVID-related risks for these children and to alleviate stress from many of these families in medicine. I took notes on specific COVID-19 prevention and exposure policies and protocols in these childcare facilities for the top 30 medical schools that offered onsite childcare and how they can affect healthcare workers. After researching and identifying the protocols for COVID-19 positive, exposure, and symptomatic procedures and essential elements such as vaccination and masking requirements, we were able to propose ways in which institutional policies should be formalized.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 3

Noorah Aldaghlas ’24

Major(s): Economics

Title: Educated on Educators: An Internship at the Vermont Agency of Education

This summer, I interned with the Vermont Agency of Education in the Education Quality and Standards Division. Most of my work was focused on helping to build a Grow-Your-Own (GYO) Alternative Pathway to Teacher Licensure Program in Vermont. The GYO will target Education Support Professionals already working in schools to help them attain a teaching endorsement. My work included drafting a logic model, reaching out to others in the industry, attending webinars with educators across the country, creating a survey to send to all Vermont public schools, and writing an interview protocol for a forthcoming focus group.

This experience was funded by: Student Internships Endowed Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 1

Ariel Alexander ’24

Major(s): Biology

Title: Bereaved Parents Perspectives on Financial Toxicity at End-Of-Life for Children with Cancer

Financial hardship children with cancer and their families face at end-of-life (EOL) and during bereavement is an under-researched area, especially for children and families of color. To gain more insight, we performed secondary data analysis of interview transcripts from interviews with parents from California and Alabama. Almost all families (52 [95%]) discussed themes related to financial...
toxicity. Parents’ identified barriers to financial wellness, including insufficient financial support, insurance issues, and long-term financial toxicity. Parents’ also identified caregiving opportunity costs as they struggled to balance work and spending time with their child. Basic needs, funeral costs, and medical-related costs were described as financial stressors. Community and hospital support was identified by many parents as crucial for alleviating financial strain. The study’s results prompt further research on parent perspectives on financial toxicity at EOL especially for families of color and interventions to address financial toxicity experienced.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 4

Evan Arch ’24

Major(s): Physics
Other Authors/Contributors: Ryan Reigle ’23, Tosh Le ’24
Supervisor(s) and affiliation or institution: Barry Costanzi (Assistant Professor of Physics, Carleton College)

Title: Measuring Noise in Oscillating Mesomagnetic Dots

The behavior of magnetic systems on the “mesoscale” (scales in the 100s of nanometers) is difficult to model due to the interaction of the classical magnetostatic energies and quantum exchange energies. This is also the length scale at which many magnetic information technologies reside. To better understand magnetic systems at this scale, we study the magnetization of ~200x200x10 nm permalloy (Ni80 Fe20) dots. This magnetization can, under the right external conditions, quickly oscillate between two states producing random telegraph noise. Due to the small size of the dots, it is impossible to directly measure their magnetization. Additionally, the small stochastic signal can be difficult to detect without sufficiently screening out all other oscillatory signals in the system. Using the anisotropic magnetoresistance and a careful grounding and shielding protocol, we can measure the random telegraph magnetic noise signal in individual dots, a signal that is 1 part in 10^5 of the base resistance signal. This framework will allow direct probing of the dynamics in other mesoscale magnetic systems.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 5:45 - 6:30 p.m.
Poster number: 2

Audrey BadjounDzouabet ’24

Major(s): Sociology/Anthropology

Title: The School-to-Prison Pipeline: Interventions and its Relationships with Black Young Women

The school-to-prison pipeline (STP) remains one of the most pervasive forms of structural violence that policy makers, activists, and scholars attempt to reform. This pipeline models how schools’ disproportionate punishment of students from marginalized socioeconomic and racial backgrounds serve as a barrier to youth’s academic and social progress, leading to contact with the criminal justice system. However, existing research of the STP often neglects to include the experiences of black female students within educational institutions. By incorporating black feminist thought into this model, I highlight the ways in which racism and patriarchy intersect to push black female students out of schools. In identifying the efforts made to disrupt the STP, I draw attention to the dearth of studies evaluating
the efficacy of different interventions (classroom-focused, teacher-centered, student-centered pedagogies). Through this framework, I plan to investigate the impact and effectiveness of disciplinary alternative schools as an intervention for black girls.

This experience was funded by: Mellon Mays Undergraduate Fellowship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 3

Sophie Baggett ’23

Major(s): Biology

Title: Investigation of Platelet Mechanobiology with Microfluidic Devices: Fabrication and Function

Platelets are essential agents in primary and secondary hemostasis. Platelet aggregation can be induced independent of soluble agonists both in vivo and in vitro in microfluidic devices. These devices simulate vascular injury and allow for the quantification of platelet plug force and area. Manufacture of these devices can be improved by using reusable urethane resin instead of single-use polydimethylsiloxane. Devices show that PolySTAT, a therapeutic synthetic cross-linking polymer does not impact primary hemostasis. In the future, the devices could be coupled with calcein acetoxyethyl and p-selectin to track individual platelet movement and activation.

This experience was funded by: The Kolenkow-Reitz Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 5

Avi Bailon ’23

Major(s): Environmental Studies

Title: GIS Contractor for the US Geological Survey

This summer I was offered a position at the USGS Upper Midwest Water Science Center where I was doing GIS Analysis for Water Use in the United States. This work consisted of using Python, ArcGIS Pro, and Excel Spreadsheets to analyze current USGS Maps on their website and ‘fix’ points that didn’t accurately represent the location of watersheds due to map conversions or outdated data.

This experience was funded by: Environmental Studies Department

Presentation time: 4:30 - 5:15 p.m.
Poster number: 6

Jonah-Kai Baker ’24

Major(s): Religion

Title: Good Courage Farm Internship

During my internship with Good Courage Farm, an organic regenerative fruit farm and Christian agricultural ministry, I was given the opportunity to be integrally involved with its community, its labor
force, and its mission. I worked primarily as a farm laborer, but also assisted with liturgical events and hospitality.

This experience was funded by: Wiebolt Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 4

Grace Bassekle ‘24

Major(s): Sociology/Anthropology

Title: Exploring the World of Climate Justice Philanthropy

In the summer of 2022, I interned at the Climate Museum in New York City, NY. I was the development intern I worked on composing work ups, compiling research on climate justice philanthropy, and tackling the process of writing small grants.

This experience was funded by: Nini’s Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 7

Tyler Beasley ‘24

Major(s): Biology

Title: Psychiatry at Hôpital Saint-Antoine

During my internship I shadowed medical students and psychiatrists throughout the day. Most of my involvement was just being present in the room during evaluations, however, I also spent time in the mornings with the nurses and physicians going over the updates from the night shift.

This experience was funded by: General Student Internships Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 8

Ruby Becker ‘25

Major(s): Undecided

Title: Northfield Public Schools Summer Plus Program

This summer I participated in a community engagement internship through the Northfield Public School District Summer PLUS program. This program provides summer school support for students who are identified by their classroom teachers as those who could benefit from extra academic assistance based on a variety of criteria. My principal responsibilities were to prepare classroom materials, assist classroom teachers, assist in food service, and assist the administrator in the smooth functioning of the program. Through my experience this summer I was able to develop valuable workplace skills such as
cooperation, communication, and leadership. I enjoyed the opportunity to work with youth and experience a workplace environment. This experience was funded by: Ki Ki Gore Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 5

**Nicolas Bell ’23**

Major(s): Geology
Supervisor(s) and affiliation or institution: Lizzy Trower (Professor of Geological Sciences, CU Boulder), Bri Hibner (Graduate student, CU Boulder)

**Title: Investigating the Effects of Environment on Short-Term Microbial Mat Sediment Binding**

Polygonal microbial mats live in the intertidal zone of Little Ambergris Cay (LAC) in the Turks and Caicos Islands, a <2000-yr-old island composed mainly of ooid sand. We hypothesized that sediment trapping and binding by microbial mats has contributed to the formation of LAC during sea-level rise. We designed lab experiments to determine how quickly polygonal mats can trap and bind sediment in different environmental conditions: wave-agitated subtidal (fully subaqueous) and subtidal without wave agitation. Conditions were simulated in the lab with different aquaria. We added ooid sand to the mats before they were incubated undisturbed for 8 hours. Ooid trapping and binding was characterized by imaging mats hourly with a stereoscope for the next twelve hours. More filament growth occurred in the wave-agitated environment than the non-agitated environment. As consequences of climate change continue to drive sea-level rise, microbial mats may help protect islands by stabilizing sediment accumulation rapidly.

This experience was funded by: The Kolenkow-Reitz Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 9

**Sydney Bell ’23**

Major(s): Mathematics

**Title: Let’s write an R package!**

The gaugerr package makes it easier to run Gauge R&R analysis in R. Gauge R&R analysis evaluates the accuracy of a measurement device by determining if the measurements are repeatable and reproducible. Statistical techniques such as confidence intervals and point estimates are used for analysis of variance (ANOVA). There are several models that can be used to implement the analysis depending on if the data set is balanced and if there is interaction or multiple factors. The package also provides specific functions for calculations including sums of squares, point estimates, and interval estimates for variance components.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 5:45 - 6:30 p.m.
Poster number: 6
Lillian Berets ’23

Major(s): Gender, Women’s & Sexuality Studies

Title: *Salmon in the Trees: Tracing Connectivity through the Ecologies of Southeast Alaska*

The geologic, biological, and human histories of Southeast Alaska, particularly of Prince of Wales Island and surrounding areas, trace a complex and interconnected image of community across ecologies, human and non-human. Throughout eight weeks of research and coursework, I developed a theory of connectivity for human and non-human ecologies which mirrors and intertwines with the other. Salmonids are an essential source of life and nutrients for the land and animals of Southeast Alaska, and are tied into an intimate circle of consumption, distribution, growth and flourishing across the patchy, diverse landscape. Similarly, humans support one another through mutual aid and structural heterogeneity in living in this place, deeply connected with the land and animals with whom they share community.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 10

Eden Bergene ’25

Major(s): Undecided

Title: *Marketing Internship*

Over the summer, I have worked as as a marketing intern for Anega Energies Manufacturing PLC. Some of my job responsibilities included production of marketing materials, brand concept definition, brand concept management through brand style guide, and product photography along with social media management.

This experience was funded by: Raymond Plank Chair in Incentive Economics Funding for Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 7

James Berger ’23

Major(s): Computer Science

Title: *Benhamou Global Ventures Internship*

I worked at Benhamou Global Ventures. My main project this summer was creating a platform for BGV that would allow affiliates and investors to view portfolio companies, learn more about them, and connect with them. In addition to that, I would sit in on pitches from startups looking for funding and engage in the discussions after to determine whether they would be interested in investing or not.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 11
Demetrius Blackmon-Jimenez ’24

Major(s): Geology
Other Authors/Contributors: Adele Fredericks ’25, Sebastian Forero Escovar ’25
Supervisor(s) and affiliation or institution: Daniel P. Maxbauer (Assistant Professor of Geology, Carleton College)

Title: Preliminary Results From the First Year of an Agricultural Field Trial of Enhanced Silicate Weathering as a Carbon Dioxide Removal Technology

Enhanced silicate weathering is a rapidly emerging carbon dioxide removal technology that has potential for scalable application on agricultural lands. Silicate Weathering is a natural process where water and air react to break down rocks; during this reaction CO₂ is taken out of the atmosphere and stored in the soil, and eventually the ocean. Enhanced Silicate Weathering aims to increase the amount of CO₂ sequestered by spreading crushed rock on agricultural fields, thereby increasing the surface area available for reaction. Agricultural land is well suited for this process because infrastructure exists to spread rock dust, and there are potential co-benefits of enhanced silicate weathering for crop yield and soil health. Here, we present data on soil gas flux, pore-water chemistry, and soil properties collected during the first growing season of an agricultural field trial designed to test the weathering and carbon dioxide removal potential of a naturally occurring volcanic rock (basalt) and an industrially sourced slag fertilizer. We found no significant difference in our soil gas flux data when comparing control and treatment plots. Pore-water alkalinity was significantly higher in plots treated with slag fertilizers, suggesting that carbon dioxide is being stored in soil water as bicarbonate ions. Soil sensors in the study area showed elevated electrical conductivity in both basalt and slag plots compared to control areas. Elevated electrical conductivity would suggest more dissolved ion load in soil water in treatment plots, presumably due to increased weathering rates.

This experience was funded by: The Aines Climate Solution Fund, the Meryl Rosenfeld Haber Research Fund, the National Science Foundation, and the Carleton College Geology Department

Presentation time: 5:45 - 6:30 p.m.
Poster number: 8

Malachy Bloom ’24

Major(s): Mathematics, Physics
Supervisor(s) and affiliation or institution: Vuk Mandic (Professor, School of Physics and Astronomy UMN-Twin-Cities)

Title: Angular Resolution of the Search for Anisotropic Stochastic Gravitational Wave Backgrounds with LISA

Gravitational waves (GWs) provide an exciting new domain for astrophysical, cosmological, and fundamental physics exploration. With new GW detectors such as the Laser Interferometer Space Antenna (LISA) set to launch in the 2030s, there is a very strong possibility of detecting not just individual GW events, but also vast combinations of weaker GW signals that form constant backgrounds across the sky known as stochastic gravitational wave backgrounds (SGWBs). In this work, we investigate the angular resolution of anisotropic SGWB searches with LISA by simulating and analyzing anisotropic SGWB signals using the Bayesian LISA Pipeline (BLIP). We use a spherical harmonic basis and a full-width-half-max method to characterize this angular resolution. We find that the number of spherical harmonic components used to conduct the search is the dominant contributor to angular resolution, but other factors may have smaller, yet non-negligible effects.
This experience was funded by: Class of 1970 Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 9

**Avery Blumenthal ’23**

Major(s): Environmental Studies
Supervisor(s) and affiliation or institution: Nancy Braker (Puzak Family Director of the Cowling Arboretum and Senior Lecturer in Biology, Carleton College)

**Title: Will Establishing a Native Parasitic Plant (Pedicularis canadensis) Increase Plant Diversity in the Carleton Arboretum Prairie Restorations?**

Pedicularis canadensis is a native hemiparasitic plant. We contributed to three studies to test whether introducing P. canadensis can help increase plant diversity in prairie restorations.

We assessed the yield of 1000 P. canadensis seeds planted in 2017 by scattering or cutting method. In 2022, the yield is very low for both planting methods. Seedlings were located up to 50 cm from the parent plant. We assessed the yield of P. canadensis planted in 2019 at rates of 25, 50, and 100 seeds/square meter. Yield increases relatively linearly with planting rate. There were 27 potential host species among the two nearest plants to each Pedicularis. We designed an Introduction and Competition Study to examine the effects of P. canadensis introduction on species richness and composition in prairie restorations. We collected P. canadensis seed from three counties that will be planted into Carleton and St. Olaf prairies in fall 2022.

This experience was funded by: The William Muir Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 10

**Mileana Borowski ’25**

Major(s): Undecided

**Title: Exploring Prison Based Dog Training Programs**

I had the amazing opportunity to spend my summer interning for Believet as a researcher. My research was guided by the question “How could Believet partner with a local correctional facility?” I embarked by investigating the intriguing intersection of the U.S. prison system and HAI’s (human animal interaction programs). However, what began as research on the institutional groundwork for such a program grew to focus more on creating data-driven informational materials. My work consisted of puzzling together the odd news article covering a new program launch with dense, scientific research articles. Taking advantage of any willing interviewee, I was also able to map out past PDPs in Minnesota and see therapy dogs in action. The culmination of my work was the formation of a handbook for future inmate participants, supervisors, and educational materials for donors and general audiences.

This experience was funded by: Class of 1970 Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 12
Sam Bradie ‘24

Major(s): Computer Science

Title: My Time With SayKid

This summer I worked as a game design intern. I made several voice interactive games designed to be played with a 'ToyBot', which is developed by SayKid. These games were more or less Alexa Skills, and are made for kids.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 13

Owen Brennan ‘24

Major(s): Economics

Title: Affordable Housing Development

I worked in affordable housing real estate development as a finance intern. I understood how the Low Income Housing Tax Credit works, and how the government incentivizes developers to construct these buildings. My day-to-day job functions were meeting with senior staff in the Financial Planning and Analysis Department so they could show me what I needed to do, like pull reports for a project or update information. In my free time I tried to learn as much about real estate as I could.

This experience was funded by: Solhem Business Fellowship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 11

Lauren Bundy ’23

Major(s): French and Francophone Studies

Title: Imaginary Worlds at the Musée en Herbe: Art, Education, and Cultural Engagement

The Musée en Herbe is a children’s art museum located in Paris, France. Featuring a rotating exhibit, the museum offers interactive visits and artistic workshops for schools and independent visitors, as well as community outreach programs in schools and organizations throughout the city. As an intern, I facilitated workshops and engaged with visitors as they explored the exhibit.

This experience was funded by: Wiebolt Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 14
Kate Burton ’24

Major(s): Biology
Supervisor(s) and affiliation or institution: Laura Gamer (Instructor, Rosen Lab, Department of Developmental Biology, Harvard School of Dental Medicine)

Title: Periosteum Protein Expression in BMP2 cKO Mice

To understand how Bmp2 regulates protein expression in the periosteum and periosteal function, ulnae, radii, and femora bones were isolated in control and KO mice at e16, P0, P7, and P14. Immunofluorescence was performed (via Rosen Lab procedures) marking Sox9, Osx, Gli1, Ctsk, pdgfRα, nestin, DLX5, αSMA, and NG2.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 15

Nora Caballero ’23

Major(s): Chemistry
Supervisor(s) and affiliation or institution: Deborah Gross (Charles “Jim” and Marjorie Kade Professor of the Sciences, Carleton College)

Title: Cooking-Induced Particulate Matter in Ethiopia: Methodology and Data Analysis

Almost 3 billion people cook using biomass fuels—such as charcoal and wood—worldwide. Cooking with biomass fuels produces high concentrations of aerosol particles in the air especially when cooking is occurring in small and poorly ventilated spaces. Regular exposure to these high levels of aerosol concentrations can lead to respiratory complications as well as other health issues. The World Health Organization recommends an average daily exposure to PM2.5 of 15 micrograms per cubic meter. We can characterize the levels of emissions that people are exposed to in their daily lives by examining PM2.5 data from cooking in kitchens in urban and rural areas of Ethiopia, when cooks are using different types of fuel/stove combinations. Attributing PM2.5 concentrations that we measure to cooking events requires having clear start and stop times for the events, which we get in some cases by monitoring the temperature of the stoves. In other cases, where this was not possible, we have determined specific criteria for identifying events. This enables us to compare the results obtained in a large number of cooking events.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 4:30 - 5:15 p.m.
Poster number: 16

Cole Cadaram ’23

Major(s): Chemistry
Supervisor(s) and affiliation or institution: Shannon S. Stahl (Steenbock Professor of Chemical Sciences, University of Wisconsin-Madison)

Title: Unveiling Trends in M-N-C Catalyst Performance by Developing a Model Reaction for Kinetic Studies
M-N-C (metal-nitrogen-carbon) catalysts enable facile aerobic oxidation reactions, but their active sites and mechanisms are contested. Previous studies conducted in aqueous solvents have suggested mechanisms and active sites for the particular aerobic oxidation of hydroquinone. In this work, a general aerobic oxidation reaction conducted in organic solvents is developed into an assay for kinetic studies of M-N-C catalysts. The assay is utilized for kinetic studies which build on our understanding of M-N-C’s and their active sites. Previous data suggests that the hydroquinone oxidation is catalyzed by metal centers that represent porphyrin rings. By comparing the aforementioned data to our own, we are able to investigate the nature of active sites in aerobic oxidation reactions conducted in organic solvents.

This experience was funded by:

Presentation time: 5:45 - 6:30 p.m.  
Poster number: 12

Eway Cai ’23

Major(s): Chemistry, Statistics  
Supervisor(s) and affiliation or institution: Danielle Atibalentja (Postdoctoral Fellow, Stanford University), Dean Felsher (Professor of Medicine, Stanford University)

Title: *Immunogenic Cell Death as a Possible Mechanism for MYC Inactivation-Induced Immune Response*

Previous research done in the Felsher lab has suggested that MYC plays an important role in the global regulation of adaptive and innate immunity. MYC inactivation has been shown to be associated with NK cell maturation, CD8+ T cell activation, macrophage activation and more. Currently, the exact mechanism of how MYC inactivation leads to immune response has not yet been extensively examined. Danielle proposed immunogenic cell death (ICD) as a possible link between MYC inactivation-induced apoptosis and subsequent immune activation. We hypothesize that MYC inactivation leads to immunogenic cell death and the damage-associated molecular patterns (DAMPs) released in apoptosis leads to B cell activation, which has been shown by Danielle’s data on increased antibody titers. The molecular markers/patterns associated with immunogenic cell death include extracellular ATP release, Calreticulin exposure to the cell surface, HMGB1 translocation to the extracellular space, increased type I IFN signaling and more. This summer, I used CellTiter-glo and Realtime-glo to test for ATP release, flow cytometry to look for CRT exposure and immunofluorescence to look for HMGB1 translocation after MYC inactivation using doxycycline in 4188 and EC4 cell lines.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 5:45 - 6:30 p.m.  
Poster number: 13

Huanchen Cai ’25

Major(s): Psychology  
Supervisor(s) and affiliation or institution: Yuichi Shoda (University of Washington)

Title: *Essentialization of Racial Categories in Psychology Publications*

We reviewed articles published in the first two months of 2022 in eight top journals in psychology to assess how racial information is reported. Among the 86 studies that mentioned race, 67.4% used essentializing language like “30% of the participants were Black” as opposed to “30% of the participants self-identified as Black.” At least 54.3% of the studies required participants to choose from a researcher-
supplied set of racial categories instead of using their own words. The majority of these studies failed to report the questions used to determine participants’ racial identity in the article itself, reinforcing the view that race is an objective characteristic. Stating participants’ race without referring to how they racially identify in their own words is problematic, because it can perpetuate an essentialist view that racial categories are objective, immutable, and natural, rather than socially constructed and based on perceivers’ subjective judgment and social context.

This experience was funded by: Wiebolt Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 17

Bee Candelaria ’24

Major(s): Classics

Title: Ancient Athenian Attitudes Towards the Working Class

I examine attitudes towards the ancient Athenian working class and the exploitation that they experienced. Most of the ancient Greek sources scholars use come from the ancient Athenian upper-class. Thus, despite documented literacy in all strata of ancient Athenian society, our modern conception of the ancient Greek working class reflects the biases of the ancient Athenian elite. Namely, the Athenian upper-class viewed the working class as beggars and leeches who should not be provided for with the philanthropy that flowed seamlessly between the elite themselves. I argue that the free working class was not viewed as truly free by the Athenian elite. Their freedom was further undermined by exploitation which was justified by the Athenian upper-class perspective on freedom. This conception of the free working class and the exploitation they suffered are supported by literary, historical, and archaeological evidence that I have gathered through reading primary sources and secondary scholarship.

This experience was funded by: Mellon Mays Undergraduate Fellowship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 14

Emma Carlson ’23

Major(s): Biology
Supervisor(s) and affiliation or institution: Jennifer Wolff (Professor of Biology, Carleton College)

Title: Ventral Cord Masculinization in Hermaphrodite C. elegans

Within the ventral cord of the nematode C. elegans, there are sex specific neurons derived from the same precursor cells. In hermaphrodites, 6 VCs develop whereas males develop 9 CAs and 10 CPs from P.naap cells. To further study these developmental differences, we sought to masculinize the P lineage in hermaphrodite worms. Previous studies have successfully masculinized the core nervous system by inserting fem-3, a masculinizing gene, with rab-3, a pan-neuronal promoter (Lee & Portman, 2007). However, rab-3 is not expressed in the precursor cells of the P lineage, therefore these studies did not result in masculinization of the ventral cord. Other studies have found a gene involved in egg laying, hli-
3, that is expressed sufficiently early to masculinize the ventral cord (Perez & Alfonso, 2020). By inserting fem-3 into the ventral cord using hlh-3 as a promoter, we seek to gain more insight on the sex specific development of these neurons.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 4:30 - 5:15 p.m.
Poster number: 18

**Elena Cebulash ’23**

Major(s): English

**Title: Close Reading for The Climate: Working as a Research Intern for Chrysalis Environmental Podcast**

Over the summer, a few other Carleton students and I worked as interns for Carleton Alum John Fiege on Chrysalis Podcast, a new project of Fiege Films that looks to interview prominent poets, scholars, professors, artists, and chefs interested in sustainability and environmentalism. As a writing and research intern, I had the opportunity to perform close readings of various poets’ work, write up reports of their literature and activism and formulate interview questions for their time on the podcast.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 19

**Martha Chan ’25**

Major(s): Undecided

**Title: Research of DPD Deficiency and Surgical Intern**

DPD Deficiency is a genetic mutation that causes the body to produce fewer DPD enzymes which are essential for breaking down 5FU (fluorouracil). 5FU is a common drug used in chemotherapy for cancer patients. However, if 5FU builds up in the body, it is severely toxic. Cancer patients with a DPD deficiency usually experience stronger side effects, so they receive a smaller dose of 5FU in chemotherapy.

At Beacon Hospital, I studied how much 5FU should be used for patients with DPD deficiency, and when and how the dosage should be increased. I reviewed all patients’ DPD deficiency test reports. Then I compared the side effects between patients with DPD deficiency and patients who don’t. I also recorded the cycle number and treatment number of any dosage change the doctors made for each patient.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship and Abeona Endowed Fund for International Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 15
**Aiden Chang ’23**

Major(s): Computer Science

**Title: Internship With Charles Schwab**

I interned with Charles Schwab and was put on three teams. I researched, refactored, and tested thinkorswim software originally developed in Bash and converted it to Python, automated the verification process of testing third-party connections, and produced a full stack development monitoring the status of internal and external programs and servers.

This experience was funded by: Raymond Plank Chair in Incentive Economics Funding for Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 16

**Eric Cheng ’23**

Major(s): Statistics

**Title: Effect of P300/CBP inhibition on Transcriptome in Ewing sarcoma cell lines**

Previous experimentation conducted by the Kyba lab suggested that iP300w- a novel inhibitor of the P300/CBP- effectively inhibits transcription of the CIC-DUX4 oncoprotein. It was hoped that iP300w could serve a similar role in Ewing Sarcoma since the primary oncodriver of Ewing Sarcoma EWS-FLI1 depends on P300/CBP as well. Preliminary experimentation preformed by the Kyba lab suggested that iP300w inhibits proliferation of Ewing Sarcoma cell lines. To further explore the effects of iP300w on Ewing Sarcoma, the Kyba lab treated four Ewing Sarcoma cell lines with iP300w. I was tasked with analyzing the data and interpreting the results.

This experience was funded by: Sam ’75 and Meg Woodside Fund for Career Exploration.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 17

**Athena Chittur ’24**

Major(s): Physics
Supervisor(s) and affiliation or institution: Ryan Terrien (Assistant Professor of Physics and Astronomy, Carleton College)

**Title: Investigating the KI Line of M-Dwarf Stars**

It is often useful to look at the variations in the spectra of stars while searching for potential exoplanets around M-Dwarf stars. These small stars have a particularly strong Potassium (KI) line that can be used to differentiate between true exoplanet signals and magnetic field effects. In our investigation, we refined measurements of this KI line in spectra from 75 different M-dwarf stars. We compiled a
collection of data and graphs that show how the equivalent width of the KI line changes periodically in the hope that it sheds light on how the rotational cycles and magnetic activity on these stars impact our examinations of stars with potential exoplanets.

This experience was funded by: The Minnesota Space Grant Consortium

Presentation time: 5:45 - 6:30 p.m.
Poster number: 18

**Dorothy SiJhen Chou ’25**

Major(s): Undecided

**Title: Faribault Middle School: Sharing Knowledge of STEAM**

This poster summarizes education at the Faribault Middle School for the Summer STEAM program and the tribulations met while introducing robotics to the students. Soft skills like flexibility and critical thinking played a large part of this experience. Throughout the seven weeks, positive relationships were solidified between the Program Assistants and the students. Also, I reached my ultimate goal, which is to persuade students to do robotics during their middle school career, when multiple students said they were inspired to do more engineering and STEM.

This experience was funded by: Pommerenke Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 20

**Sophia Chuen ’23**

Major(s): Linguistics
Supervisor(s) and affiliation or institution: Jenna Conklin (Visiting Assistant Professor of Linguistics, Carleton College)

**Title: Online Audio Recording Quality of Speech**

Increasing demand for remote research techniques necessitates investigations of the suitability of remote recording for various types of research. This study investigates the quality of data obtainable through two remote recording methods (online through Gorilla and offline via smartphone) for measuring vowel reduction. Subjects recited words with reduced or unreduced vowels taking simultaneous online and offline recordings. Results were compared to data from a second group of subjects who completed the task in-person. Remote recording methods produced comparable duration measurements to those in-person, but measurements dependent on the ability to measure frequency precisely were more varied.

This experience was funded by: The Carleton Humanities Center

Presentation time: 5:45 - 6:30 p.m.
Poster number: 19
Luisa Cichowski ’24

Major(s): Philosophy

Title: *Apprenticing at Zumwalt Acres -- Building Community, Soil Health, and a Crazy Future!*

I spent 8 weeks of my summer working at a regenerative produce farm rooted in Jewish values in Sheldon, Illinois called Zumwalt Acres. The farm is fully managed by college students and young people. The land which the farm occupies was farmed conventionally for many generations, and the young farmers who currently run it have been using regenerative methods to restore the farm’s soil health for two years. I got to help envision the future of the farm, master the practical aspects of farming, connect with the local network of regenerative farmers, learn more about the horrors of industrial monoculture farming, participate in on-site research about the carbon-sequestration capabilities of Basalt when used as a soil amendment, learn about Jewish land stewardship values, and be part of an amazing community of activists.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 20

Ella Collins ’25

Major(s): Undecided

Title: *Living More, Without a Screen; How This Summer Shaped My Life*

I was given the opportunity to work with a non-profit organization in the state of Minneasota this summer. LiveMore ScreenLess is an organization that promotes digital well-being for and with young people. They work closely with the Minnesota Department of Education to create curriculum and teaching opportunities for high school students to learn more about the influence of technology and their personal digital well-being. I worked as the Youth Summer Engagement Intern, and I was in charge of a variety of projects that accumulated into helping to edit a pre-existing Peer Education Program that was piloted this summer and will be used in Minnesota schools this coming school year. I was so fortunate to be a part of this amazing organization and work for something bigger than myself.

This experience was funded by: Class of 1963 50th Reunion Fund for Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 21

Chris Costello ’23

Major(s): History
Supervisor(s) and affiliation or institution: Susannah Ottaway (Laird Bell Professor of History, Carleton College)

Title: *Comparative Analysis Of 19th Century Blind Institutions; Deadly Consequence of A Dublin Charity*

19th Century Europe saw an influx of charitable institutions dedicated to protecting and providing for the blind. Two such Institutions, the Molyneux Asylum in Ireland and the Norwich Institution in England provide a significant point of comparison for how these Institutions functioned. More specifically, we
analyzed a period of controversy from both Institutions and examined how these moments indicate the purpose of the blind asylums, both through the controversies themselves and the methods used to rectify them. My focus was on the Molyneux Asylum, which experienced controversy in the 1850s. A public battle ensued in which the Molyneux Asylum and its staff were accused of negligent and fraudulent practice by a group of disgruntled donors.

This experience was funded by: The Carleton Humanities Center

Presentation time: 5:45 - 6:30 p.m.
Poster number: 22

**Helen Cross ’24**

Major(s): Biology
Other Authors/Contributors: Rhesel Rivera ’23
Supervisor(s) and affiliation or institution: Eric Hoopfer (Assistant Professor of Neuroscience, Carleton College)

**Title:** *Characterizing Activity-Dependent System for Labeling Neurons in Drosophila melanogaster*

Most animals exhibit complex social behaviors like courtship and aggression. However, we know relatively little about the neural circuitry involved in producing these behaviors. This project aimed to identify neurons that show increased activity during bouts of courtship behavior in Drosophila melanogaster. To do this, we used Hr38-GAL4 system, in which the regulatory region of the Drosophila immediate early gene Hr38 is used to drive expression of the Gal4-UAS system and mark active neurons with green fluorescent protein. We show that male flies that interacted with females for 24 hours exhibit strong labeling of P1 neurons compared to solitary controls. P1 neurons have been shown to regulate male courtship behavior, suggesting that the Hr38 system is suitable for marking neurons associated with social behavior. Future work will investigate the time course of Hr38 expression in neurons and apply this method to identify neurons involved in aggressive behavior.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 4:30 - 5:15 p.m.
Poster number: 21

**Ella Daniels-Koch ’25**

Major(s): Undeclared

**Title:** *"WWOOFing" in the South of France*

I WWOOFed on a berry farm in the south of France.

This experience was funded by: Student Internships Endowed Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 22
Thang Dao ’23

Major(s): Biology
Supervisor(s) and affiliation or institution: Annie Hoopes (Kaiser Permanente Washington), Charissa Tomlinson (Kaiser Permanente Washington)

Title: Understanding how MyChart Use can Support Adolescent Sexual and Reproductive Healthcare Needs

This project involved qualitatively interviewing teens, parents of teens, and physicians of teens to investigate how teens use electronic patient portals such as MyChart to access sexual and reproductive healthcare. The project is still underway, but a few emerging themes are reported. I participated in an independent literature review on the facilitators and barriers of adolescent recruitment into qualitative studies, reviewed and de-identified interview transcripts, and managed the interview coding files for coordinated team work. I learned several skills, most valuable to me were information regarding my own work ethic and what aspects of my setting help improve my productivity.

This experience was funded by: Sam ’75 and Meg Woodside Endowed Fund for Career Exploration

Presentation time: 5:45 - 6:30 p.m.
Poster number: 23

Sonya Davidson ’24

Major(s): Sociology/Anthropology

Title: Witnessing the Loose Knit of France’s Social Safety Net at URACA Basiliade

In the Goutte d’Or neighborhood, URACA Basiliade is situated at a crossroads between the whitewashed Paris most tourists visit and the Paris enriched by the thousands of African immigrants who have created a home here. Started in the 1980’s to provide care and support for French Africans affected by AIDS, URACA now helps African immigrants impacted by chronic illnesses, such as HIV, hepatitis, and depression. Social workers act as liaisons to help clients receive residency and healthcare, along with hosting workshops to build community and provide prevention education. During my time at URACA, I participated in a variety of organization activities, from administrative work to ensure grant funding, sitting in on community meetings, and acting as a translator.

This experience was funded by: Richard T. Newman Family Endowed Fund for Language Study Internships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 23

Margaret De Fer ’24

Major(s): History
Other Authors/Contributors: Raine Bernhard ’23
Supervisor(s) and affiliation or institution: Serena Zabin (Professor of History, Carleton College)

Title: The American Revolution as Divorce

This project follows the splintering of the marriage between James Urquhart and Hannah Flucker, and the ensuing family strife. The story spans from 1774 until 1787, a period that closely resembles the
American revolution as a civil war. Our research about one of Boston’s most prominent loyalist families and their flight from the emerging United States gave us insight into the nature of family, marriage, immigration, loyalists, and the global impact of slavery.

This experience was funded by: The Wu Family Fund and the Carleton Humanities Center

Presentation time: 5:45 - 6:30 p.m.  
Poster number: 24

Diana De La Paz ’23

Major(s): Latin American Studies

Title: The Art of Glassblowing

This summer, I had the opportunity to work as an intern at Carlyn Ray Designs, a glassblowing studio in Dallas, TX. Carlyn Ray Designs is a studio dedicated to fabricating exquisite glass installations for both residential and commercial spaces. Shortly after opening its doors in 2013, the studio expanded its services to include a community studio, Dallas Glass Art (DGA), and a non-profit organization, Art Reaching Out (ARO). As an intern at Carlyn Ray Designs, I had the opportunity to participate in all three organizations. At the studio, no one day was like another. My daily responsibilities included but were not limited to assisting with cane pulls, labeling sample cane, unloading the annealer, and organizing the color wall.

This experience was funded by: Jean Philips Memorial Internship Fund

Presentation time: 5:45 - 6:30 p.m.  
Poster number: 25

Divya Dendi ’26

Major(s): Undecided  
Supervisor(s) and affiliation or institution: Timo Förster (Naturforschende Gesellschaft Altenburg e.V., Parkstr.), Caroline Chaboo (Department of Entomology, University of Nebraska)

Title: Arthropod Diversity in Phytotelmata of Calathea capitata (Ruiz and Pav.) Lindl. (Zingiberales: Marantaceae) Host Plants from Peru

Cryptic habitats are often overlooked in biodiversity surveys. Phytotelmata, plant pools, are one type of cryptic habitat that support diverse fauna in a miniature ecosystem. This study surveys the arthropod community of two types of phytotelmata on a single species, Calathea capitata (Ruiz and Pav.) Lindl. (Zingiberales: Marantaceae), from one Amazon site in Peru. Specimens were collected from eight bracts and eight leaf rolls. A total of 54 arthropod specimens (39 adults, 15 juveniles) were identified to 33 morphospecies that were then identified as 3 spiders (Araneae), 9 beetles (Coleoptera: Chrysomelidae), one earwig (Dermaptera), four flies (Diptera), one bug (Hemiptera: Cicadellidae), and 21 ants (Hymenoptera: Formicidae). More individuals (55.6%) were found in bracts than leaf rolls. The most abundant family in the Calathea capitata bract community was Formicidae, while the most abundant family in leaf rolls was Chrysomelidae. A similar survey of Calathea lutea in Peru also found a population of mostly Coleopteran individuals with a few Dermaptera and Hymenoptera, but did not encounter
Araneae, Diptera, or Hemiptera. This paper demonstrates that phytotelmata host diverse taxa and serve as a nursery to immature stages. There is a lot more to learn from the study of cryptic habitats and how they may impact the life cycle of their native fauna, which in turn may affect their natural history.

This experience was funded by:

Presentation time: 5:45 - 6:30 p.m.
Poster number: 26

Sadie DiCarlo ’25

Major(s): Undecided

Title: The Effect of Temperature Variability on Disease Transmission

With funding from Carleton’s Global Edge program, I spent the summer in Dublin, Ireland working in the Luijckx Lab at Trinity College Dublin studying how variability in cold temperatures can affect the parasite-host relationship between Daphnia magna and Ordospora colligata.

This experience was funded by: Global Edge Program, Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship, Abeona Endowed Fund for International Internships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 24

Clayton Dippold ’24

Major(s): Political Science/International Relations

Title: Introduction to the Crypto Legal World

Being an intern at Warburton Advisors was flexible and I was introduced to a variety of work. I organized and edited company policy documents involving terms of use, arbitration, and cookies. I contributed in the research and the writing of a white paper for DAO’s. Also, I gathered information about cryptocurrency events, policy changes, and legal and regulatory developments. As a remote intern, I developed my skills in time management as well as scheduling. I really enjoyed how the internship was flexible with time and that I was able to get a diverse experience. Overall, it was a eye opening experience and it was very helpful due to the diversity of work as well as the flexibility of the internship itself.

This experience was funded by: Class of 1963 50th Reunion Fund for Internships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 25
Patrick Djerf ’24

Major(s): Mathematics

Title: *Plants in France: Exploring Biodiversity*

I worked with a team from the Sorbonne University and France’s Natural History Museum, performing a biodiversity and pollinator activity survey. We visited sites all around Île-de-France, taking data on the abundance of plant species and how active the pollinators were. At each one, we observed and collected insect specimens, which we later identified and processed in the lab. These same exact locations are visited every year, giving scientists decades of data on plant biodiversity and overall ecosystem health.

This experience was funded by: Abeona Endowed Fund for International Internships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 26

Lara Dominguez ’25

Major(s): Undecided
Supervisor(s) and affiliation or institution: Daniel Hernández (Professor of Biology, Carleton College)

Title: *High Species Richness in Prairies without Dominants is Maintained as Dominant Grasses Invade*

A goal of prairie restoration is the establishment of diverse communities. However two grasses, Sorghastrum nutans and Andropogon gerardii, are often especially dominant in restored prairies, and diversity is lower than in native prairie. In 2012, a prairie experiment was established in the Cowling Arboretum. Plots were planted with or without the dominant species in a high diversity seed mix. We measured the dynamics of species richness and the possible encroachment of dominant grasses into plots where they were initially absent. In 2019, a native forb, Solidago altissima, was the dominant species when the dominant grasses were absent. However by 2022, S. nutans had invaded the plots where it was initially absent, replacing S. altissima as the dominant species. Despite this shift in dominance, control plots maintained higher species richness over time. Thus, the encroachment of dominant grasses comes at the expense of goldenrods. The sustained higher species richness in plots planted without dominant grasses indicates a lasting advantage to excluding dominant grass seed when restoring and planting prairies.

This experience was funded by: The Rosenow Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 27

Maya Donovan ’23

Major(s): Economics, Philosophy

Title: *Working as a Research Assistant at the UCSF*

Initially, I conducted a literature review on the relationship between climate and health in California and Kenya to understand what relationships were significant and well-established. I read systematic reviews and meta-analyses about these relationships, summarized them, extracted any useful risk ratios, and
compiled them into an Excel spreadsheet. I then transitioned to extracting a variety of inputs necessary to populate the wildfire-asthma microsimulation model, along with the relevant context needed to interpret them correctly. In order to record these inputs with a clear understanding of what the authors meant, I carefully analyzed the studies’ methodologies. Over the course of the assistantship, I received biweekly feedback on my methods from Professor Kahn and Sigal Maya.

This experience was funded by: The Dolores D. Oswald ‘46 and Hanan D. Wedlan Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 28

Luke Drake ’25

Major(s): Undecided

Title: Towards Optimization of Digital Imaging and Communication in Medicine (DICOM) Processing Via Artificial Intelligence

The use of digital imaging and communication in medicine (DICOM) images in medicine is widespread. Advanced imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI), however, can generate hundreds of individual DICOM files with a single scan. This summer, I developed an SQL database to read, organize, and store all DICOM files in the Mayo Clinic Department of Radiology’s Artificial Intelligence (AI) Laboratory’s imaging database repository. To do so, I created a graphic user interface (GUI) to permit file uploading into the database and devised an organizational strategy to place the files into a logical framework in association with the relevant metadata for each scan. Via an iterative process, I optimized the time required to upload the files most efficiently. Finally, I created a GUI to efficiently permit database queries. This platform establishes the basis by which Mayo Radiology AI laboratory personnel will access Mayo DICOM images.

This experience was funded by:

Presentation time: 5:45 - 6:30 p.m.
Poster number: 29

Cathy Duan ’25

Major(s): Undecided

Title: From Design to Code: Building an Android App with Community in Mind

Over the summer, I had the opportunity to participate in a remote app development internship run by the nonprofit Dandilyonn. The aim was that, after ten weeks, each team would present the environment-focused Android app they designed and implemented. My group decided to focus on food insecurity. We wanted to easily connect users who needed food with food pantries, soup kitchens, and restaurants offering food, which ultimately spurred our minds to combine the words ‘food’ and ‘network’ to form our app’s name, ‘Foodwork’.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurs

Presentation time: 4:30 - 5:15 p.m.
Poster number: 27
Aarnie Dushime ’23

Major(s): Economics

**Title: Think Tank for Action on Social Change**

This summer, I interned at the Think Tank for Action on Social Change (TASC) based in Dublin, Ireland. As a health inequalities research assistant, my responsibilities included researching four different cancers prevalent in Ireland and the inequality of diagnoses, and gathering data through interviews I conducted with mental health specialists from France.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship and Abeona Endowed Fund for International Internships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 28

Noah Eckersley-Ray ’23

Major(s): Classics

**Title: Administrative Law at the Massachusetts Housing and Shelter Alliance**

MHSA is a non-profit located in downtown Boston that works to end homelessness through permanent housing solutions in the Greater Boston Area and throughout Massachusetts. MHSA works both as an advocacy organization and as an intermediary between the state and federal government and other non-profits in Massachusetts. MHSA is a small organization with less than twenty employees but through two of their programs has housed well over two thousand people. While at MHSA I primarily summarized contracts in order to lighten the administrative burden on smaller non-profits to whom MHSA sub-contracts.

This experience was funded by: Project ’60 Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 30

John Eichelberger ’24

Major(s): Mathematics

**Title: Union Organizing in Rochester Hotels**

This summer, I had the opportunity to work with Cooperation Cannon River, a Northfield-based non-profit, in support of the Rochester Kahler Hotels’ UNITE HERE! Local 17 union campaign.

The Kahler Hotel workers -- a group that spans four separate hotels -- once held a reputation as the finest hotels in Rochester. This reputation has been spent after decades of deliberately understaffing and underpaying the workers on which the hotels depend. But the workers have been fighting back, rebuilding their union and agitating for fair wages and conditions.
My place in this struggle was as a staffer, providing logistical and administrative support. I bought food, built spreadsheets, copy-edited press releases, helped design a website, and more. In other words, I helped turn the workers’ organizational plans into a reality.

This experience was funded by: Student Internships Endowed Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 29

**Kaylin Engerman ’23**

Major(s): Biology
Supervisor(s) and affiliation or institution: Dan Hernández (Professor of Biology, Carleton College), Mark McKone (Towsley Professor of Biology, Carleton College)

**Title: Effects of Dominant Grass Encroachment on Plant Biomass Dynamics in a 10-year Prairie Restoration Experiment**

In restored prairies, dominance by some grasses decrease conversation value, as their high biomass lowers diversity by outcompeting rarer species. We established a prairie restoration experiment in the Cowling Arboretum where plots were planted with or without the dominant species in a high diversity seed mix. In 2015 and 2022, we measured root biomass and aboveground net primary productivity (ANPP) by plant functional group and compared changes over time. Plots planted with dominant grasses had greater root biomass than those where dominant grasses were initially absent, even 10 years after planing. ANPP was higher in the dominant grass addition plots in 2015, but did not differ between treatments in 2022. Dominant grass biomass increased in plots where it was initially absent, from 0.2% in 2015 to 34.1% in 2022. The percent biomass of rarer species also increased in control plots. Only the biomass of Solidago altissima, an unplanted forb that can be weedy in some prairies, has decreased in response to dominant grass invasion. Thus, planting prairies without dominant grasses may be a way to increase conservation value and allow for rarer species to establish before potential dominant grass invasion.

This experience was funded by: The William Muir Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 31

**Dawson Eriksen ’23**

Major(s): French and Francophone Studies, Religion

**Title: Sur les étagères: Identity and the Franco-Belgian Comic**

How does the presentation of the Bande Dessinée impact author visibility and representation following the “Year of the BD”? Little thought is ever given to the consumer object of a piece of literature at Carleton, and perhaps to generalize, the academy at large. My project will go into “BD Stores” and analyze and document what makes it on the shelves, and what role identity might play. This kind of “walkthrough” ethnography will return the BD to its consumerist context and expose ways in which marketing strategies impact its presentation.
Maya Feldberg-Bannatyne ’23

Major(s): Geology
Supervisor(s) and affiliation or institution: Cameron Davidson (Charles L. Denison Professor of Geology, Carleton College), John Garver (Professor of Geology, Union College)

Title: Plutonism in the Sitka Greywacke: Preliminary U/Pb Dating

The Sanak-Baranof plutonic belt, extending the 2,000km Alaskan coastline, systematically youngs to the east from 63-42 Ma. This consistent pattern of ages ceases along the easternmost coast at Baranof Island as most of the plutons are similar ages. North of Baranof Island, Yakobi and Chichagof Island plutons are 52-48 Ma except the Squid Bay pluton which is 42.4 Ma. The general ages of these plutons overlap with the Sanak-Baranof belt ages, consistent with the dates on Baranof Island, while the Squid Bay pluton might be a young Sanak-Baranof or part of the Eshamy group located in the Prince William Sound. The felsic plutons intrude the Sitka Greywacke which has previously been correlated with the Chugach-Prince William Terrane turbidite sequences from the Upper Cretaceous and Paleocene.

Jeremy Fleishhacker ’23

Major(s): Physics

Title: DUNE Sensitivity and Oscillations Beyond the Standard Model

The Deep Underground Neutrino Experiment (DUNE) is a next-generation accelerator experiment that will measure neutrino oscillations with unprecedented precision. A strong neutrino beam is produced at the Fermi National Accelerator Laboratory and directed through two detectors: one near the source and the other nearly 1300 km away at the Sanford Underground Research Facility in Lead, South Dakota. Making precise measurements of neutrino oscillation parameters may help us answer some of the biggest open questions in particle physics, including why we observe more matter than antimatter in the universe. In this study, we explore DUNE’s long-term ability to resolve degeneracies and correlations between measurements of oscillation parameters. We find that a long-term DUNE run effectively resolves these complications. We also find that, despite these degeneracies, a long-term run may be highly sensitive to a test for oscillations beyond the Standard Model, which could be explained by new physics.

This experience was funded by: Center For Regional and Glocal Studies Junior Research Grant
Presentation time: 4:30 - 5:15 p.m.
Poster number: 30

Presentation time: 5:45 - 6:30 p.m.
Poster number: 32

Presentation time: 5:45 - 6:30 p.m.
Poster number: 33
Connor Flinn ’23

Major(s): Biology
Other Authors/Contributors: Allie Fridkin ‘23
Supervisor(s) and affiliation or institution: Mark McKone (Towsley Professor of Biology, Carleton College)

**Title: Identification of the Seed Predators of Aster Species**

Predispersal seed predators significantly reduce plant reproductive success in many species. Larvae of these predators feed inside flower heads, absorbing nutrients and consuming seeds. We investigated seed predators in heads of four species of aster (genus Symphyotrichum) in restored native prairie in Northfield, MN. Heads were collected in late fall, and dissected to extract seed predators for identification by DNA barcoding. A diverse set of seed predators was identified, including members of three insect Orders: beetles (2 species), moths (3 species), and flies (1 species). Though the aster species shared some seed predators, the insect community differed between asters even within the same site. We are currently developing a guide for identification of seed predator larvae by focusing on visual differences between groups that can be verified with DNA barcoding. This could potentially be implemented in future studies in order to expedite identification of seed predator larvae.

This experience was funded by: The William Muir Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 34

Gustavo Flores ’23

Major(s): Mathematics
Supervisor(s) and affiliation or institution: Anne Shiu (Professor of Mathematics, Texas A&M University), Saber Ahmed (Visiting Assistant Professor of Mathematics and Statistics, Hamilton College)

**Title: Convexity of Four-Maximal Neural Codes**

A central challenge facing neuroscientists is deciphering neural code, or understanding the relationship between stimuli and neural activity. Our motivating example comes from hippocampal place cells. Place cells have corresponding place fields in an animal’s environment that trigger them to fire faster. Hence, place cells help the brain figure out where an animal is in space. Interestingly, place fields have been experimentally observed to be approximately convex. To represent the stimuli-neural activity relationship mathematically, we use combinatorial neural codes, which record neural activity as a collection of sets called codewords. Convex codes can be realized by a family of convex open sets in Euclidean space, so they model place cells and place fields. Past research has identified local obstructions to convexity, which completely characterize convexity for codes with at most 3 maximal codewords. We turn to 4-maximal codes and extend this characterization to some families of such codes.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 35
Isabel Folger ’24

Major(s): Cognitive Science, Psychology

Title: Supporting Social Psychology Research in Reducing the Effects of Weight Stigma

This summer, I interned as a Research Assistant in the UMN Health and Eating Lab under Dr. Traci Mann. I supported multiple projects during this internship, all of which tested methods of reducing stigmatizing behavior towards heavier people. I am fortunate that this gave me the opportunity to witness and work on studies at various stages in the research process. The breadth of the work included researching independent variable manipulation techniques and methodologies for a study rerun; attending group meetings and contributing to the proposed revisions; designing participant recruitment materials; revising IRB, preregistration, recruitment strategy, questionnaire, and consent form documents; sourcing materials for in-person studies; editing infographic designs to be used in a study questionnaire; creating and revising surveys in Qualtrics; and drafting scripts for in-person studies. Literature reviewing and preparing IRB documentation were important skills I gained, as well as balancing independent and collaborative work.

This experience was funded by: Student Internships Endowed Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 31

Hannah Frankel ’23

Major(s): Political Science/International Relations

Title: Interning with Growing Up Healthy

This summer, I interned with Growing Up Healthy, a bilingual, Northfield-based nonprofit that primarily serves low-income, Latinx families. My co-intern and I executed the Evenings in the Park programs in multiple neighborhoods in Rice County, in which we connected families to community resources/partners such as early childhood grants, the Community Action Center, and Sharing our Roots. Additionally, we communicated with community members in English and Spanish to gauge their needs, created informational posters in English and Spanish on topics such as climate change, and prepared resources for Night To Unite.

This experience was funded by: Barbara A. Will ’70 Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 32

Emma Freedman ’23

Major(s): Political Science/International Relations

Title: International Land Law and Gender Equality Internship at Resource Equity

Resource Equity is a non-profit that seeks to combat inequality in land law in order to build a world that is equitable, secure, and empowering for women. Most recently, the organization partnered with the World Bank to conduct research on the legal structures that define female land ownership in nearly twenty countries across the globe. As a summer intern, I located official government copies of over one
hundred legal documents pertaining to women’s land ownership laws in these twenty-two different countries. The documents I collected will be added to a public database called Landwise which is maintained by Resource Equity. Scholars, lawyers, and political scientists will be able to use these documents to more accurately understand how land laws may perpetuate gender inequality and how these laws could be amended to create more equitable systems of land ownership.

This experience was funded by: Class of 1970 Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 33

**Bella Frost ’24**

Major(s): English

**Title: Working in Communications on Capitol Hill**

As a Press Intern for the Office of U.S. Senator Tina Smith, I worked closely with the communications team to write press releases, social media posts, quotes, newsletters, and website content. My tasks also included compiling daily press clips to track where the Senator was mentioned in the news and creating a weekly social report to track Twitter and Facebook engagement.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 36

**Samira Gado ’24**

Major(s): Psychology

**Title: Cindy Axne for Congress**

As a Student Ambassador for Cindy Axne’s campaign, I knocked on door and called registered voters to convince them to vote for her.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 34

**Andras Galambos ’24**

Major(s): Physics
Other Authors/Contributors: Yuelin Kuang ’25
Supervisor(s) and affiliation or institution: Helen Minsky (Assistant Professor of Physics, Carleton College)

**Title: Introducing Flaws into Polydimethylsiloxane Adhesives**

Adhesives are used in many engineering, robotics, and manufacturing settings. Real-world applications of adhesives often contain both micro- and macroscopic flaws that make them more or less prone to
failure. While the mechanism behind different types of adhesive failures is well-studied, in order to reliably use adhesives, it is also important to understand the effect of flaws on the effectiveness of an adhesive. We investigated techniques to introduce consistent, repeatable macroscopic flaws into an adhesive, polydimethylsiloxane (PDMS), and determined that adding a layer of mica powder is the best choice. Using a probe tack test, we measured the adhesive strength of PDMS with flaws of various sizes and observed a decrease in adhesive strength as flaw size increases after a critical value.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 5:45 - 6:30 p.m.
Poster number: 37

Katherine Geist ’24

Major(s): Chemistry
Other Authors/Contributors: Sean Boyce ’23
Supervisor(s) and affiliation or institution: Daniela Kohen (Professor of Chemistry, Carleton College)

Title: Molecular Dynamics Study of Cation Sites in Zeolites

Zeolites are minerals with incredibly promising applications in carbon capture. However, incomplete understanding of the exact chemistry controlling the adsorption of CO2 prevents optimizing their carbon capture potential. Adsorption is controlled by incredibly small atomic motions, which are on the order of 10-15 seconds and 10-10 meters, which are too small to study with traditional laboratory methods. In order to understand them, we used computational simulations that use quantum mechanics to accurately predict these motions. We analyzed the resulting trajectories, focusing primarily on the idea of cation sites, which are locations where cations are most likely to be found. Because these sites can serve as chokepoints limiting the adsorption of CO2, characterizing them offers key insights into the carbon capture applications of zeolites.

This experience was funded by: NSF Grant

Presentation time: 5:45 - 6:30 p.m.
Poster number: 38

Cassie Gerard ’25

Major(s): Undecided

Title: Determining Feature Importance in Silver Nanoparticle Synthesis

Silver nanoparticles absorb different amounts of UV and visible light based on their size and shape allowing them to be used in photochemical processes and devices. The aim of the experiment was to determine which reagents, or features, were most impactful on the size and shape of the nanoparticles. The shapes and sizes of the nanoparticles were measured with UV-visible spectroscopy (UV-vis), Transmission Electron Microscopy (TEM), and Small Angle X-ray Scattering (SAXS). SHapley Additive ExPlanations (SHAP), a machine learning algorithm, determined how each reagent, or input, affected the outputs, or the sizes and shapes of the nanoparticles. A threshold for PVP, silver nitrate, and Triton X-100 concentrations was observed; exceeding this limit caused aggregation of the nanoparticles.
nitrate has the largest effect on size while sodium citrate affects shape the most. Future experiments such as finding the effects of other reducing and stabilizing agents can be investigated.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 39

**Sam Gilbert ’24**

Major(s): Religion

**Title: Gender Based Violence Prevention and Education**

This summer, I had the opportunity to work with The Justice Desk, a community-based human rights NPO in Cape Town, South Africa. As a programming intern at The Justice Desk, I helped to coordinate the iNtsika yeThemba project, which engages with roughly fifty boys aged thirteen to eighteen from township communities in the Cape Flats to equip them with tools to prevent gender-based violence in their communities. More than just planning the bimonthly iNtsika sessions, I was involved in creating a long-term curriculum for the program, securing long-term donor funding for iNtsika and The Justice Desk. I also completed several assorted long term projects for the Justice Desk, including drafting and submitting a United Nations Universal Periodic Review for the Republic of Zambia.

This experience was funded by: Initiative for Service Internships in International Development

Presentation time: 4:30 - 5:15 p.m.
Poster number: 35

**Louisa Grader ’24**

Major(s): History

**Title: Angie Craig for Congress Fellowship**

This fellowship provided the opportunity to learn about the work that goes into running a congressional campaign. Work included the management of volunteers, speaking with voters/constituents, learning about fundraising, and learn about use of social media.

This experience was funded by: Jean Phillip’s Memorial Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 36

**Ben Griesel ’24**

Major(s): Statistics

Supervisor(s) and affiliation or institution: Heidi Spratt (UTMB Department of Biostatistics and Data Science), Alejandro Villasante (UTMB Department of Biostatistics and Data Science), Alice Versiani (UTMB Department of Pathology), Nikos Vasilakis (UTMB Department of Pathology)

**Title: Using machine learning to predict changes in clinical manifestations of DENV following the introduction of ZIKV in São Paulo, Brazil**
Dengue virus (DENV) is an arboviral disease whose incidence has greatly increased over the past 50 years due mainly to population growth and uncontrolled urbanization in tropical and subtropical countries. As of 2009, the WHO categorizes severity of DENV by three levels: with warning signs, without warning signs, and severe DENV. Brazil has faced a rapid increase in the number of DENV cases in recent years, especially in the state of São Paulo, which in 2019 was the state with the most cases (a 103% increase from 2018). The main vector of DENV in Brazil is the Aedes aegypti (L.) mosquito 2 which forms many breeding grounds in discarded items such as containers, buckets, and used tires. ZIKV, a related mosquito-borne flavivirus to DENV, infiltrated Brazil during the 2015 outbreak and caused difficulty in diagnosing disease due to their similar symptomatology. In conducting our analysis, T1 is defined as the DENV cohort gathered from 16,034 individuals between 1998-2006 and T2 is defined as the DENV cohort gathered from 12,461 individuals between 2016-2019, for a total of 28,495 individuals.

This experience was funded by: Sam ’75 and Meg Woodside Endowed Fund for Career Exploration

Presentation time: 5:45 - 6:30 p.m.
Poster number: 40

Aaryan Gulati ’24

Major(s): Economics

Title: Examining Data on the French Legislative Elections

Examining and consolidating data relating to the 1st and 2nd rounds of the French 2022 legislative elections. This includes using excel to simplify data making it easier to read, writing reports on the structure and learning about the system and political climate as a whole.

This experience was funded by: Dolores D. Oswald ‘46 and Hanan D. Wedlan Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 37

Skye Gulledge ’23

Major(s): English, Japanese Language and Literature

Title: Resisting Definition and Anti-Autobiography in Han Suyin’s A Many-Splendored Thing

Ostensibly a Cold War Orientalist romance, Han Suyin’s novel, A Many-Splendored Thing, in reality resists definition. The 1952 novel follows a semi-autobiographical Han Suyin as she navigates early Cold War Hong Kong and a taboo, interracial affair. Yet the basic plot overlays the novel’s complex negotiations between East and West, and reality and fiction. I analyze two elements of Han’s writing: the use of ambiguity (by denying rigid definition) and the self-referential nature of the novel’s construction. Examining the novel’s structure, its setting of mid-century Hong Kong, and the mixed-race protagonist Han Suyin, I argue that the novel’s autobiographical qualities belie Han’s obscuration of herself. Though the novel’s popularity helped launch Han into international fame as an expert on China, she remained, as foreshadowed by A Many-Splendored Thing, an enigmatic figure for the rest of her life.

This experience was funded by: Mellon Mays Undergraduate Fellowship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 41
Malachy Guzman ’25

Major(s): Mathematics (Prospective)
Supervisor(s) and affiliation or institution: Vivek Kumar (Associate Professor, The Jackson Laboratory); Brian Geuther (The Jackson Laboratory)

Title: Visual Prediction of Mouse Mass With Machine Learning

Mouse model experiments often rely on body weight as a key indicator of health. This makes measurement accuracy important, but the frequent handling required to weigh mice on a scale can induce physiological stress responses, potentially interfering with the intended experiment. Efforts have been made to engineer physical solutions, but these approaches are typically neither scalable nor applicable to a wide range of experimental setups. To avoid these problems, we developed a non-invasive, generalizable computer vision approach to predict mass from video data. We applied segmentation and ellipse-fit deep neural networks to extract area and geometry information from individual mice in open field arenas. We combined this with sex, strain, and age information to predict mass. Over 1-2 hours of sampling, our full model predicts individual mouse mass with a mean absolute error of 1.28g and mean relative error of 5.4% between predicted and true mass.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 42

Clay Haddock ’24

Major(s): Economics & Statistics

Title: Summer at Agena and Yale SOM

I spent the summer working at AGENA Investment management as well as at Yale SOM.

This experience was funded by: Class of 1970 Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 38

Margaret Hall ’25

Major(s): Chemistry
Supervisor(s) and affiliation or institution: Deborah Gross (Charles “Jim” and Marjorie Kade Professor of the Sciences, Carleton College), Tsegaye Nega (Associate Professor of Environmental Studies, Carleton College).

Title: Cooking-Induced Particulate Matter in Ethiopia: The Effects of Improved Cookstoves

Much of the world’s population relies on biomass fuels, primarily wood or charcoal, for cooking. These emit aerosols that can induce dangerous health effects when individuals are exposed to high concentrations for long periods of time over the course of several years or decades. Our research compares datasets measuring the concentration of PM 2.5 in cooking environments with traditional charcoal or wood stoves to cooking environments where an improved cookstove is used. Improved cookstoves are designed to burn pellets made of abundant industrial waste products such as coffee husks or lumber scraps, and also have a high thermal efficiency in addition to being an economically feasible solution to the indoor air pollution problem. The main goal in comparing the PM 2.5
concentrations for these stove types is to test our hypothesis that improved stoves emit less than traditional wood or charcoal stoves.

This experience was funded by: Ferret Research Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 39

Barry Han ’25

Major(s): Undecided

Title: Research on the Application of Abstract Algebra in R3 Geometry

This is a highly learning based research internship that lasted almost three months from the start of June to the end of August. I worked on the application of abstract algebra in geometry under the supervision of Professor Tsao-Hsien Chen of UMN with a focus on using isometry to solve problems in R3 geometric plane. I studied and worked on different proofs of limited numbers of platonic solids in R3 (it’s impossible to have more than 5 platonic solids). We attempted to construct the proof from an angle perspective and a group theory perspective.

This experience was funded by: David T.C. Jones’74 Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 40

Wenlai Han ’23

Major(s): Chemistry, Computer Science
Supervisor(s) and affiliation or institution: Yuan Zhang (Post-doctoral scholar, MIT), Alison Wendlandt (Green Career Development Assistant Professor of Chemistry, MIT)

Title: Photochemical pathway for selective epimerization of primary chiral α-amines

Enantiopure chiral amine moieties are critical building blocks for pharmaceuticals, natural products, agrochemicals, food additives, and a wide variety of biologically active molecules. Accordingly, developing methods for the stereo-selective synthesis of chiral amines remains important. Methods of preparing chiral amines via organoradical species generated photocatalytically show promises including good chemoselectivity and functional group tolerance. Our research involves light-mediated selective epimerization (i.e. changing of stereochemistry at one chiral center) as a powerful late-stage synthesis strategy to access chiral amines. This strategy has been used to synthesize rare sugars, other carbohydrates, and vicinal diols at the Wendlandt lab, where this research was done. This study extended the applications of this stereo-editing strategy to the epimerization of primary chiral amine via a novel catalytic system. Preliminary mechanistic studies suggested a proton/electron transfer initiated hydrogen atom transfer pathway that is complementary to previous epimerization works.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 43
Faith Hanshaw ’23

Major(s): Biology
Supervisor(s) and affiliation or institution: Mike Nishizaki (Assistant Professor of Biology, Carleton College)

Title: *Keep Breathing! Gaping patterns and respiration of invasive mussels in the Pacific Northwest*

Mussel beds are numerically dominant on many marine shores and their biology holds the potential to dramatically alter local water chemistry. Through respiration, mussels lower both O2 and pH (by adding CO2 to the water). Previously, we have documented that respiration rates vary under different environmental conditions for mussels in short-term experiments. Their true impact, however, remains unclear in the absence of data addressing how long mussels remain: 1) open with their shells “gaping” and; 2) physiologically active in a given day or tide cycle. This study aims to better understand the relationships among respiration, calcification and, gaping behavior of an invasive mussel from the Mediterranean.

This experience was funded by: NSF Grant

Presentation time: 4:30 - 5:15 p.m.
Poster number: 41

Greta Hardy-Mittell ’23

Major(s): Latin American Studies

Title: *826 MSP Education Internship*

826 MSP is a youth creative writing center in Minneapolis which serves K-12 BIPOC students and publishes their work. Its summer program, Outdoors Outspoken, teaches environmental justice issues alongside field trips and creative writing workshops. In summer 2022, I was honored to be 826 MSP’s education intern.

This experience was funded by: Rob White ’85 Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 42

Bailey Harmon ’23

Major(s): Biology
Supervisor(s) and affiliation or institution: Kok Siong Yeo (Department of Biochemistry and Molecular Biology, Mayo Clinic College of Medicine), Jane Zhu (Associate Professor of Biochemistry and Molecular Biology, Department of Biochemistry and Molecular Biology, Mayo Clinic College of Medine)

Title: *Engineered CAR-Macrophage to Target Neuroblastoma*

Neuroblastoma is a rare childhood cancer with limited effective treatment options. Our objective through this project is to optimize CAR-macrophage therapy efficacy against neuroblastoma cells. Using phagocytosis assays with THP-1 cells selected for our introduced H-CAR/GFP construct expression and a treatment with CD47 antibody, we analyzed the level of phagocytosis observed when these cells were co-cultured with Kelly cells. A trend of increased phagocytosis events was observed for both methods of
optimization. Our project is ongoing with a goal of future work aiming to continue optimizing this approach.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 44

Abdisalan Hawadle ’23

Major(s): Biology

Title: The Effects of Temperature and Flow on Respiration in two Marine Mussels

Intertidal organisms are subject to environmental variations that may influence their physiological performance. As processes such as respiration depend on gas exchange between organisms and their environment, they are potentially affected by water temperature and velocity. This study compares the effects of multiple environmental stressors (temperature and flow velocity) on the respiration rate in two mytilids, the Mediterranean mussel, Mytilus galloprovincialis and the temperate bay mussel M. trossulus. Thermal performance curves (5, 11, 17, 23, and 29 °C) for respiration rate were quantified at five different flow velocities (2, 4, 6, 10, 20 cm s⁻¹) in a fully crossed design. Well-defined thermal performance curves were present at moderate to high water velocities, whereas, at the lowest velocity (2 cm s⁻¹) respiration rates remained low across all temperatures. Although Mediterranean mussels displayed higher thermal optima than Bay mussels under moderate flow speeds (4-6 cms⁻¹), those differences were absent at higher flow velocities (>10 cms⁻¹). These results highlight the importance of considering hydrodynamic conditions when estimating thermal tolerance in marine mussels.

This experience was funded by: Larson International Fellowship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 45

Gavin Hazen ’23

Major(s): Chemistry
Other Authors/Contributors: Yichen (Ethan) Li ’23
Supervisor(s) and affiliation or institution: Steven Drew (Professor of Chemistry, Carleton College)

Title: Creating Cheaper Mixed Metal Oxide Films for Renewable Hydrogen Production

Hydrogen production via water splitting reactions in a photoelectrochemical cell utilizing mixed metal oxide films has had promising results. Our research expands upon prior research on the Fe, Cr, Al oxide system, utilizing a cheaper electrochemical deposition technique to create mixed metal oxide films. We successfully performed ternary metal deposition to create films of specific metal molar ratios to promote film photoactivity. Deposited films were shown to be consistently p-type using collected 2D photoelectrochemical data. Utilizing energy dispersive X-ray spectroscopy, we spatially analyzed the elemental composition of our films and found that the deposited Fe-Cr-Al molar ratios were inconsistent film to film. Hypotheses to explain this observation will be presented, as well as ideas for further experimentation.

This experience was funded by: The Aines Climate Solutions Fund and the Carleton College Department of Chemistry

Presentation time: 4:30 - 5:15 p.m.
Poster number: 43
Sophia Heidebrecht ’23

Major(s): English
Other Authors/Contributors: Ellie Reinhold ’23

Title: Dressing the Past: Style and Substance in the Tudor Court

Our research dove into the world of the Tudor court by exploring its dress — both the technical construction of clothing, and its social and religious significance to its wearers. We compared how the Tudors would have “read” the language of clothes to how modern viewers learn about and interpret historical fashion. As evidenced by the money spent on it, laws passed to attempt to control it, and its prominence in contemporary accounts, Tudor fashion was an integral element of communication and public representation. While the modern eye often overlooks the importance of clothing, we aimed to achieve a fuller understanding of what the Tudors wore in order to gain a depth of insight into the wearers and their lives.

This experience was funded by: Paul and Lynn Kelley International Fellowship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 46

Ella Hein ’23

Major(s): Chemistry

Title: Integrated Mesoscale Architectures for Sustainable Catalysis

Internship at Harvard spinout developing new air filter tech: coating a butterfly-wing-like substrate with catalytic nanoparticle coating

This experience was funded by: Helen M. Golde 85’ Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 44

Katelyn Hemmer ’24

Major(s): Political Science/International Relations

Title: Social Media Strategy Internship with Mutual Aid Myanmar

This summer I had the opportunity to help with social media strategy, research, and organization for Mutual Aid Myanmar through a remote internship. We spent most of our time creating social media content using Canva and open source images as well as researching image copyright laws and privacy measures for sensitive information.

This experience was funded by: Donald A. Camp ’70 and Elizabeth Hart Camp Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 47
Simon Hempel-Costello ’24

Major(s): Physics

Title: *Autonomous Vertical Quadcopter Landings*

Perching onto surfaces can allow flying robots to stay at desired heights and locations for little to no energy. This paper presents the application of an EPHE machine learning algorithm to autonomous vertical perching for a quadrotor equipped with a suction-based bistable gripping mechanism. This mechanism allows for successful landing actions from a wide range of incoming angles and velocities. The combination of machine learning techniques and mechanical intelligence allowed for a robust and consistent landing action. We implemented a simulated environment to train the EPHE algorithm and were able to produce a consistent landing action in the simulation.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 48

Sam Hiken ’23

Major(s): Computer Science, Mathematics
Supervisor(s) and affiliation or institution: Nicole Wein (DIMACS)

Title: *Approximation Algorithms for Token Swapping*

Consider the following problem: we are given a connected graph on n vertices, with each vertex labeled by a distinct "token." We define an "edge swap" as the process of swapping tokens on adjacent vertices. What is the minimum number of edge swaps needed to get from an initial placement of tokens to a target placement? This problem – known as token swapping – is NP-hard, but there is a constant-factor polynomial-time approximation algorithm called the "happy swap-chain algorithm." We give tight bounds on the approximation factor of the happy swap-chain algorithm, while presenting another constant-factor approximation we call the "generalized cycle algorithm." We also give hardness of approximation results for two variants of the token swapping problem: weighted token swapping and colored token swapping.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 49

Servon Hinton ’24

Major(s): Political Science/International Relations

Title: *Sigma Financial Corporation Internship*

Sigma Financial Corporation is a broker-dealer that works directly with financial representatives around the United States.

Sigma has six departments: Compliance, Operations, Trading, Licensing, Technology, and Planning.

During my time at Sigma, I worked in the Planning Corporation, helping representatives transfer client information from data sheets to the new database Sigma uses to take over their old database. This database is called Black Diamond.
I spend some time in the trading department doing stock research.

This experience was funded by: Raymond Plank Chair in Incentive Economics Funding for Internships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 45

**Ania Hoang ’23**

Major(s): Chemistry

**Title: Science Writing Intern at Concussion Alliance**

This summer I had the opportunity to intern remotely as a science writer for Concussion Alliance (CA), a Seattle-based non-profit organization that focuses on raising awareness surrounding mild traumatic brain injury (mTBI) and helping concussion patients with their journey to recovery.

The program included an in-depth concussion curriculum, Expert Guest Speakers. As a science-writing intern, most of my time was spent on writing bi-weekly synopsis for the online newsletter and working on my long-term project.

My project, in collaboration with another intern, was updating a resource page on vestibular therapy: what vestibular therapy is, how it can help with alleviating concussion symptoms and be beneficial in the role of concussion rehabilitation. I also included possible exams and balance exercises that may be used or prescribed by a vestibular therapist. Other helpful resources such as visuals, and other patient testimonials were also included in the resource page.

This experience was funded by: Butzin Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 50

**Shakeal Hodge ’23**

Major(s): Computer Science

**Title: Final Touch LLC Summer Research Intern**

My internship organization is Final Touch LLC a construction/home improvement company that focuses primarily on renovating houses before they are out on the market. During this internship, my daily tasks were focused on data collection and cleanup, with the broader goal of creating an interface that allows for easier access to the necessary data by enhancing the backend API of the website being developed. I also collected client identification data as well as project data (measurements, materials, cost) and began modifying the interface to access this information for both the client and business partners.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 46
Annemily Hoganson ’24

Major(s): Mathematics

Title: Partition Fun: On Certain McKay Numbers of Symmetric Groups

For primes $\ell$ and nonnegative integers $a$, we study the partition functions $p_\ell(a; n) := \# \{ \lambda | \text{vdash } n : \text{ord}_\ell(H(\lambda)) = a \}$ where $H(\lambda)$ denotes the product of hook lengths of a partition $\lambda$. These partition values arise as the McKay numbers $m_\ell(\text{ord}_\ell(n!)) - a; S_n)$ in the representation theory of the symmetric group. We determine the generating functions for $p_\ell(a; n)$ in terms of $p_\ell(0; n)$ and specializations of specific D’Arcais polynomials. For $\ell = 2$ and $3$, we give an exact formula for the $p_\ell(a; n)$ and prove that these values are zero for almost all $n$. For larger primes $\ell$, the $p_\ell(a; n)$ are positive for sufficiently large $n$. Despite this positivity, we prove that $p_\ell(a; n)$ is almost always divisible by $m\ell$ for any integer $m$. Furthermore, with these results we prove several Ramanujan-type congruences. These include the congruences $p_\ell(a; \ell^k n - (\delta(a, \ell^k)) \equiv 0 \mod{\ell^{k+1}},$ for $0 < a < \ell$, where $\ell = 5, 7, 11$ and $\delta(a, \ell) := (\ell^{2} - 1)/24 + a\ell$, which answers a question of Ono.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 51

Bjorn Holtey ’23

Major(s): Political Science/International Relations
Supervisor(s) and affiliation or institution: Barbara Allen (James Woodward Strong Professor of Political Science and the Liberal Arts, Carleton College)

Title: Examining Election News: Political News Coverage by Upper Midwest Local Television Stations in 2008 and 2016

Election news outlets in the United States have become increasingly more diverse in recent decades, but television remains one of the most widely consumed news platforms (Shearer 2021), and televised election news can play a large role in informing the American electorate. Local television can be central to this trend; a 2019 Pew Research Center report found that 86% of surveyed Americans have obtained local news from local television, and 38% report doing so often (Pew 2019). This research analyzes Upper Midwest television news coverage of elections and political candidates in 2008 and 2016; it serves as an extension of previous research regarding coverage of the U.S. general elections by Minnesota television stations, part of Professor Barbara Allen and Professor Daniel Stevens’ Carleton College Election Study that began in 2000. This specific poster draws on prior writing that I have completed alongside Jacob Smith ’22 and Beck Woollen ’23.

Presentation time: 4:30 - 5:15 p.m.
Poster number: 47
Mattias Hoz ’25

Major(s): Undecided

Title: Policy and Advocacy in the Governor’s Office

This summer, I served as a communications and policy intern with the Office of Governor Tim Walz and Lieutenant Governor Peggy Flanagan. I contributed to the Governor’s efforts to publicize his administration’s many projects and policy stances. This work came took the form of several projects: drafting press releases on economic relief programs, crafting public statements to be delivered to the media, posting messages to the Governor and Lt. Governor’s official social media profiles. My most significant accomplishment was independently researching, writing, and revising a longform op-ed advocating an expansion of gun control in Minnesota, which is set to be published under the governor’s name.

This experience was funded by: The Jean Phillips Memorial Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 48

Helen Hu ’23

Major(s): Cognitive Science

Title: Perceiving Symmetry Across Wide Separations

Our visual system possesses strong proclivity for detecting bilateral symmetry. This proficiency relies on comparisons of spatially non-contiguous sections of the visual field. Here, we investigate symmetry classification performance as a function of spatial separation between image flanks. We assessed classification accuracy and reaction times for symmetric and asymmetric images wherein the flanks were separated by distances ranging from 6 to 30 degrees of visual angle. Data across 44 adult participants reveal that: 1. Accuracy stays stable until 10 degrees of separation and then declines steadily, 2. Despite a decline relative to the central presentations, classification accuracy in absolute terms is well above chance even at the greatest spatial separation tested, and 3. Reaction time exhibits a progressive increase as flank separation increases. These findings and inferences point to several interesting avenues for further research into the substrates of symmetry perception in particular, and long-range analyses more broadly.

This experience was funded by: The Kolenkow-Reitz Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 49

Cassie Huang ’24

Major(s): Chemistry

Title: First Principles Approach to Extracting Chemical Information from X-Ray Absorption Near-Edge Spectra of Ga(I)-Containing Materials

Based on previous studies on Ga(III) compounds with XANES, we did a similar analysis with Ga(I) compounds, including both bulk and molecular structures through a computational method. We used
CASTEP code to simulate the K-edge absorption of +1 Ga sites and compared the results between CASTEP and FEFF simulation for bulk structures as well as between bulk and molecular structures. Compared to bulk structures, Ga(I) molecular compounds show a less obvious pattern, and our conclusion is that the oxidation state cannot be used as a fingerprint for identifying different sites in Ga-containing compounds.

This experience was funded by: The Kolenkow-Reitz Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 50

Scott Hudson ’24

Major(s): History

Title: Collections Intern at the Baltimore Museum of Industry

Aided in the processing, cataloging, and online presentation of artifacts in the collection of the Baltimore Museum of Industry, an organization dedicated to collecting and presenting the economic heritage of Baltimore, MD.

This experience was funded by: Sam ’75 and Meg Woodside Fund for Career Exploration

Presentation time: 5:45 - 6:30 p.m.
Poster number: 52

Chiamaka Ifedi ’23

Major(s): Cognitive Science

Title: Real Nation Internship

This summer, as part of the Carleton Global Edge Program, I traveled to Dublin, Ireland where I worked as a summer intern in an organization called Real Nation. This poster highlights one of the projects I worked on as an intern there. This was a Market Research project. We used qualitative and quantitative research methods to gain a better understanding of a potential consumer group for our client.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship and Abeona Endowed Fund for International Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 53

Oliver Jacobs ’23

Major(s): History, Political Science/International Relations

Title: World in a Dish: History, Food and Culture in Oman and Jordan

This summer I was awarded the Larson Fellowship and used the fellowship to study the relationship between history, food and culture in Oman and Jordan. In my time in both countries, I explored the central bazaars, talked to as many people as I could, visited museums and of course ate lots of food. I
found that food itself can be an amazing medium to both meet people and to better understand a culture. While everyone eats food, they differences in how we do so can reveal the history, norms, values and environment that a society has grown from.

This experience was funded by: Larson Fellowship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 54

**Tatiana Jimenez ’23**

Major(s): Studio Art, Chemistry

**Title: Designing a bifunctional small molecule probe to sequentially detect H2O2 and protein sulfenic acid modifications**

Cystine sulfonic acids (Cys-SOH) are oxidative posttranslational modifications (OxiPTMs) which act in biologically significant redox and signaling pathways. However, sulfenic acids cannot be monitored via classical techniques, such as antibody crystallography, due to their extreme reactivity. Instead, the activity of Cys-SOH has been studied via small molecule probes. In this project, the bifunctional and nucleophilic probe 3-((4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)benzyl)oxy)cyclohex-2-en-1-one was synthesized and characterized in vitro. The potential substituent group 4-((phenylamino)methyl)phenyl boronic acid pinacol ester was also characterized in order to guide future synthesis of Cys-SOH and H2O2 probes small molecule probes. Kinetic assays were conducted via mass-spect and LTQ to determine the second order rate constant of oxidative cleavage of the pinnacle ester group. Ultimately, 3-((4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)benzyl)oxy)cyclohex-2-en-1-one was found to have a rate constant of 2310 M-1 S-1, while 4-((phenylamino)methyl)phenyl boronic acid pinacol ester exhibited a slightly faster rate constant of 2700 M-1 S-1.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 55

**Helen Jin-Lee ’23**

Major(s): Biology, Chemistry
Supervisor(s) and affiliation or institution: James Siriwongsup (Harvard University), Justin Kim (Dana-Farber Cancer Institute, Harvard Medical School)

**Title: Development of a Ligand-Directed Target Identification Method**

In drug discovery, target identification is an important step in which the activity of a pharmacophore is linked to the specific biological molecules it interacts with. The current gold standard for target ID is photoaffinity labeling, but it suffers from poor labeling efficiency and requires extensive ligand-specific linker length optimization. To overcome those limitations, our lab explores methods to perform ligand-directed covalent capture of target proteins. This project investigates properties of alternatively activated probes on various ligands of interest. The results indicate target-specific labeling and linker-length dependence for some probe variants. This work continues our group’s development of novel and efficient alternatives to the conventional photoaffinity labeling method. We hope to eventually utilize these probes to elucidate novel targets and off-targets of drugs with currently unknown mechanisms of action.

Presentation time: 4:30 - 5:15 p.m.
Poster number: 51
Teagan Johnson ’23

Major(s): Computer Science, Statistics

Title: Developing a Scientific Data Search Engine

NCAR’s diverse scientific data holdings have historically been difficult for external scientists and users to search across and find the data, publications, and software they need to do their science. While there is a current search tool that aggregates these scientific holdings, the idea of this project is to experiment with searching using a different technical approach. Going into the summer, our goal was to enhance the technical design and improve user-facing features of the application.

In order to accomplish these goals, we utilized web development technologies (Spring Boot, Solr, GitHub, etc.), used Agile scrum methodologies, and applied best practices for web development. Our work demonstrates the value that can be provided to scientists that are solving some of the biggest challenges related to atmospheric and earth systems. The search engine’s robust and minimal design allows for easy and accurate access to NCAR’s rich archive of scientific metadata.

Presentation time: 4:30 - 5:15 p.m.
Poster number: 52

Diana Kachman ’23

Major(s): English
Supervisor(s) and affiliation or institution: Alyssa Hemke (Seattle Children’s Research Institute)
Dr. Julia Mattson (Seattle Children’s Research Institute)

Title: Implementing Peer Supports in Behavioral Parent Training Programs in Underserved Communities

Behavioral disorders are common in young children but can cause significant impairment when left untreated. In response, behavioral parent training (BPT) programs are evidence-based treatment programs for child disruptive behaviors. The implementation of “peer supports” within existing BPT programs would allow more families to be reached and benefit the peer parents themselves by helping them enhance and maintain their own use of healthy parenting strategies. We wanted to gauge the desirability of implementing parent peer supports in BPT programs, such as the Incredible Years program (IY), to their reach in underserved communities. Eleven former IY parents were contacted, and seven chose to participate in our focus group. We heard mostly positive feedback on the idea of implementing peer supports, especially on what would be useful to them in a peer support. I wrote the modules that peer-supports would use to train, covering special playtime, timeouts, planned ignoring, and communication strategies.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 56
**Maggie Kerwin ’23**

Major(s): Biology

**Title: Investigating the Structural and Cellular Roles of Angiomotin Isoforms**

HIV-1 is a membrane enveloped virus that relies upon host cellular proteins of the ESCRT pathway to bud and escape from cells. Early-acting ESCRT factors, ESCRT-associated E3 ubiquitin ligases, and host adaptor proteins are recruited to sites of viral assembly and budding by “late assembly domains” found in viral structural proteins. Angiomotin (AMOT) acts as an adaptor between viral structural proteins and the host ubiquitin ligase NEDD4L, and is required for efficient viral escape. The exact role of AMOT, however, remains unclear. In the absence of AMOT, assembling HIV-1 Gag molecules are unable to form a fully spherical enveloped particle and HIV-1 release is inhibited, whereas the overexpression of AMOT significantly stimulates HIV-1 release. There are four different isoforms of the AMOT protein: AMOT p80, AMOTL1, AMOTL2 and AMOTL2 p60. In this study, we generated constructs of the AMOT p80 and AMOTL1 isoforms and expressed these in 293T cells.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 53

**Maya Khesin ’24**

Major(s): Physics
Supervisor(s) and affiliation or institution: Arjendu K. Pattanayak (Professor of Physics, Carleton College)

**Title: How does chaos affect the average over quantum measurements?**

Quantum backaction from weak measurement affects the dynamics of nonlinear quantum systems in intriguing and useful ways. Previous simulations showed that for an optical cavity based implementation of the driven Duffing oscillator, the phase setting φ for a laser used for measurement changes quantum dissipation. This can considerably alter the energy absorbed, enabling significant control including changing the quantum trajectory dynamics from regular to chaotic and vice-versa. We present new results on the effect of measurement information being discarded, in particular by tracing over trajectories with different stochastic realizations to recover a density matrix. Disparities between dynamics at different φ vanish when sufficiently large numbers of trajectories are sampled. We also report on how results interpolate between these for finite efficiency measurements, which requires a different formalism.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 5:45 - 6:30 p.m.
Poster number: 57
Ori Kim ‘25

Major(s): Undecided

Title: *Youth Empowerment and Insecurities in Northfield*

Working at the Northfield Union of Youth provided a unique perspective of Northfield and its surrounding communities through its youth. By working with at-risk youth, I supported them in the areas of empowerment, advocacy, and enrichment. With the Key, we provided mental health services, housing options for those facing housing insecurities, contraceptives, and access to many more resources. This experience was invaluable in learning more about our broader community by immersing myself in a non-profit aiming to help all in need.

This experience was funded by: Multicultural Alumni Network

Presentation time: 4:30 - 5:15 p.m.
Poster number: 54

Sunny Kim ‘24

Major(s): Computer Science

Title: *Programming Web Crawlers*

Working as a Web Programming Intern involved the collection of alternative data from employer websites by programming web crawlers and writing scripts to parse information. This included writing code from scratch and bug-fixing/troubleshooting existing scripts. There was also a degree of data quality investigation to ensure that the data we capture and report on the website is current and accurate, not just at the level of individual values but also at a "meta-data" level.

This experience was funded by: Class of 1964 Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 58

Susanna Kisker ‘24

Major(s): Physics

Title: *Mortality Predictor after Rheumatic heart disease valve surgery: Retrospective Cohort Study*

This summer Dr. Lidetu Kayamo and I started working towards publishing a retrospective cohort study on mortality predictors after Rheumatic Heart Disease valve replacement surgery. Rheumatic heart disease results from damage to heart valves caused by one or several episodes of rheumatic fever, an autoimmune inflammatory reaction to throat infection with group A streptococcus. Adequate treatment of group A streptococcus prevents disease development. According to WHO, 2021 report, Rheumatic heart disease is the most commonly acquired heart disease in people under age 25. Every year the disease claims 288,348 lives worldwide, mainly children and adolescents from low- and middle-income countries. Despite the need, access to cardiac surgery is severely limited in sub-Saharan Africa, with an estimated 18 cardiac surgical procedures per million people compared with 1222 per million in the USA.
Preoperative risk stratification is essential for operative decision making, informed patient consent, and better surgical outcome after RHD valve replacement surgery.

I worked with Dr. Kayamo for six weeks over the summer to start data collection and analysis. I also had the opportunity to observe open heart surgeries, preform echo screenings and EKG tests, and help with patient screening and medical history collection.

This experience was funded by: Barry "Mike" Casper Memorial Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 55

Meredith Klay ’24

Major(s): Chemistry
Other Authors/Contributors: Eledon Beyene ’23
Supervisor(s) and affiliation or institution: Joe Chihade (Professor of Chemistry, Carleton College)

Title: Bacterial Expression of Unstable Mitochondrial Enzyme Mutants

The human AARS2 gene codes for the mitochondrial alanyl-tRNA synthetase. Mutations in the AARS2 gene are linked with severe diseases, including infantile cardiomyopathy and childhood to adulthood-onset leukodystrophy. We are interested in understanding how molecular differences in the mutated proteins result in different disease phenotypes. One current hypothesis predicts that mutations associated with more severe phenotypes will lead to greater protein instability compared to those associated with less severe phenotypes. We are interested in testing this hypothesis in vitro by expressing and purifying mutant and wildtype enzymes.

Initial attempts to produce mutant AARS in a bacterial expression system were unsuccessful, with poor expression of low-purity insoluble proteins. We have been able to increase mutant expression through the addition of an MBP solubility tag, which has greatly improved purification of both full length wildtype and mutant proteins. To obtain intact full length proteins without the solubility tag, we are using the highly sequence-specific protease TEV to remove the MBP tag. Current work involves determination of the effects of pathogenic mutation on protein stability using a thermofluor assay.

This experience was funded by: The Carleton Department of Chemistry

Presentation time: 5:45 - 6:30 p.m.
Poster number: 59

Aya Klos ’23

Major(s): Biology, Statistics
Other Authors/Contributors: Bryan Le ’23
Supervisor(s) and affiliation or institution: Rika Anderson (Professor of Biology, Carleton College)

Title: Changing Nutrient Availability on Early Earth Forced Ancient Microbes to Share and Retain Metabolic Genes

Nitrogen and phosphorus are two nutrients essential for life with historically important roles in the development and shaping of the early biosphere. We reconciled gene and species trees to track changes in microbial metabolisms in response to nitrogen and phosphorus limitation in the history of the earth.
By focusing on changes in the number of horizontal gene transfer (HGT) events over time, we contribute to a developing picture of biological activity and energy production in the early earth.

This experience was funded by: NSF Grant

Presentation time: 5:45 - 6:30 p.m.
Poster number: 60

**Ellis Kondrashov ’25**

Major(s): Undecided

**Title: Doing Policy Work in Wisconsin Education Policy**

I spent time working in the Wisconsin state government’s Department of Public Instruction on helping develop the specific policy initiatives which would go into the Department’s state budget request.

This experience was funded by: Sam ’75 and Meg Woodside Fund for Career Exploration

Presentation time: 5:45 - 6:30 p.m.
Poster number: 61

**Padmini Konidena ’25**

Major(s): Undecided

**Title: Interning at Concussion Alliance**

Interned at Concussion Alliance (CA) over the summer in 2022. The work included reading/watching information about concussions, attending biweekly cohort and subcohort meetings, attending guest speaker talks biweekly, writing a synopsis on a new research study every other week, and creating a new web page on the intersection between long-Covid and concussions. The work was important because many people do not realize the importance of getting proper treatment following a concussion, otherwise, patients may find symptoms lasting for weeks, and CA works to increase awareness of these issues and provide valuable information to patients and patients' family and friends.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 62

**Ezra Kucur ’25**

Major(s): Biology
Other Authors/Contributors: Sophie Baggett ’23, Collin Kelso ’25, Claire Boyle ’25
Supervisor(s) and affiliation or institution: Sarah Kennedy (Visiting Professor of Archaeology, Carleton College), Sarah Kelloway (University of Sydney)

**Title: PAMA 2022: Proyecto Arqueológico Medio Ambiente**

The PAMA 2022 project documented four colonial period sites and one Late Intermediate Period control site using GPS mapping, pXRF soil composition data, and water and vegetation sampling. The goal of the
project was to determine the impact of silver processing technology at colonial refineries on both historical and modern agricultural environments by identifying and mapping heavy metal remnants within the soil, waterways, and vegetation present at these significant archaeological sites. A secondary goal of the project required that we build relationships and channels of communication with local communities, thus enabling current and future archaeologists to share their research and raise awareness about the potential for heavy metal poisoning and accessible mitigation options.

This experience was funded by: The Carleton Humanities Center

Presentation time: 5:45 - 6:30 p.m.
Poster number: 63

Kira Kunzman ’24

Major(s): Psychology
Other Authors/Contributors: Kaori Hirano ’25

Title: Concussion Alliance Summer Internship: Resources for College Students with Concussion

Concussion Alliance’s website resource page, Populations: College Students, includes unique resources to support college students based on insights from the organization’s undergraduate interns. A section on self-advocacy empowers students to advocate for themselves and their needs by providing language to use and education about their rights under the Americans with Disabilities Act. A section on social life equips students with strategies and information for navigating common college events and activities that may provoke symptoms, such as overstimulating environments and interactions with drugs and alcohol. A peer support section provides residential assistants (RAs), club leaders, and friends with guidance on including and supporting college students with concussion. Concussion Alliance plans to collaborate with colleges and universities to implement these resources on campuses around the United States.

(taken from the 2023 International Brain Injury Association abstract that we submitted with the help of our supervisors, Conor Gormally and Malayka Gormally, as well as Dr. Elizabeth Sandel)

This experience was funded by: Student Internships Endowed, Jean Phillips Memorial Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 64

Rodrick Lankford ‘23

Major(s): Computer Science

Title: Software Development Intern For Saykid

During my internship I created a connect 4 game using Alexa’s voice recognition, JavaScript, and voice flow. This game is intended to be played by using a toy robot to communicate with users, predominantly young children. The robot tells users to choose a specific column to insert tokens into the connect 4 game board. The code then keeps track of both the robots and player token position, and reports back to the user when someone has 4 tokens in a row. The robot is also built to make smart decisions and stop the user from getting four in a row while also trying to make four in a row itself.

I also helped SayKid build the company’s dashboard for their website. I mainly dealt with the front-end side of the web development, which involves the customization of the dashboards layout, tables, and
fetching of data from the back-end databases. During my internship I was able to develop my problem-solving skills while working on several complex projects and functions that I had never been introduced to. This took a lot of critical thinking and developing solutions that can be thoroughly tested. For example when working on the connect four game not only did I have to implement algorithms I had learned in classes, but I also had to make changes to the algorithms to best adhere to the problem at hand. Then I had to run several tests to insure the algorithm would not produce errors later down the road.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 65

**Gaby Lazo ‘23**

**Major(s):** Linguistics

**Title:** *Inquiry Science Education: Supporting the Exploratorium Teacher Institute*

The Exploratorium is a hands-on, interactivity-focused science and technology museum located at Pier 15 in San Francisco, CA, founded by Frank Oppenheimer. For nearly 40 years now, this museum has been home to the Teacher Institute, a teacher education program dedicated to nurturing and supporting a community of teachers from across the state and country that bolsters joyful, inquiry-based accessible science education. This summer, I had the opportunity to join them for 10 weeks as they hosted several in-house teacher workshops: the Summer Institute, Teacher Leader Network Institute, and Alumni Institute. In this role, I supported the inner workings of the Institute’s summer programming, developing the focus and organization to contribute to a fast-paced environment. Through the program, I developed lasting connections with current and retired educators, and explored how equitable educator communities are built.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 66

**Emmett Lefkowitz ‘23**

**Major(s):** Political Science/International Relations

**Title:** *My Summer at RIAC Boston*

This summer, I was an intern at the Refugee and Immigrant Assistance Center in Boston, Massachusetts. I worked in the Preferred Communities (PC) program, which was essentially intensive case management for the most vulnerable refugees, such as the elderly, children, those with disabilities, and those who have experienced severe trauma. Our clients were primarily from Afghanistan, and my duties ranged from daily interactions, intake forms and case note writing (calling clients we hadn’t heard from to see how things are; enrolling new people into the program), to helping clients fill out the mountains of bureaucratic legal documentation, to home visits, to enrolling children in school or adults in English classes, to a whole array of anything that needed to be done. It was a life-changing experience and I am so lucky to have been able to be a part of the work that RIAC does.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 56
Elise Lehman ‘23

Major(s): Economics

Title: Genre et Communs

This past summer, I lived in Paris, France following the Carleton Paris Program to intern at L’Observatoire Français des Conjonctures Économiques - Sciences Po. I conducted economic research under the supervision of Hélène Périvier, and together we worked on developing and presenting a corpus of texts concerning the intersection between the topics: gender and common resources. The research project titled, Genre et communs, was in collaboration with the Agence Francaise de Développement (AFD) - a government agency that implements France’s development policy. My role as an economic research intern was to find, annotate, and organize literature on this topic, create a database/library for future use, and utilize R and Excel to summarize and map these findings. The internship was conducted in French which also gave me the opportunity to keep developing all of my French reading, writing, speaking, and listening skills.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 57

Aashutosha Lele ’23

Major(s): Biology, Political Science/International Relations

Title: Regenerative Farming Internship

For this internship I worked as a volunteer worker at Feed The People Co-op, a permaculture free-range chicken farm in Northfield, MN. My job included managing the flock of chickens by refilling feed and water, setting up feeding stations in the chicken paddocks, and construction and maintenance of infrastructure at the farm. I learned to apply principles of regenerative agriculture, work with others in a team, and learn the basics of raising chickens.

This experience was funded by: Rob White ’85 Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 58

Ellie Leon-Moffly ‘23

Major(s): Psychology
Other Authors/Contributors: Maddy LoRusso ’23, Suhani Thandi ’23, John Garay Hernandez ’24
Supervisor(s) and affiliation or institution: Julie Neiworth (Laurence McKinley Gould Professor of the Natural Sciences and Psychology, Carleton College), Madeline Thall ’22 (Tamarin Cognition Educational Associate, Carleton College)

Title: Examining Episodic Memory Decline in Aging Tamarins

This project examined the limits of episodic memory in aging cotton top tamarins (Saguinus oedipus) in a task constructed around past experience and object familiarity. Tamarins (n=4) were exposed to 2 objects for 5 consecutive days. In the test, after a week delay, one of the two objects was replaced by a
novel object. Longer look rates toward the novel object would arise if monkeys could remember what was there before. If familiarity is not recognized because they forgot, looking at both objects in the test would be equivalent, and preference to look would be at 50%. Episodic memory is one of the first types of memory that shows decline in aging in humans, and is especially degraded in neurodegenerative disease such as Alzheimer’s Disease (AD) (Tromp, Dufour, Lithfous, Pegayle & Despres, 2015). Cognitive outcomes will be correlated with physiological insults post mortem in our aging tamarins.

This experience was funded by: NIH NIA AREA Grant

Presentation time: 5:45 - 6:30 p.m.
Poster number: 67

Rebecca Lerda ’25

Major(s): Undecided
Other Authors/Contributors: Toby Pasternak ’25
Supervisor(s) and affiliation or institution: Mark McKone (Towsley Professor of Biology, Carleton College)

Title: Interannual Variation in Flower Visitors Among Aster Species

In tall grass prairie, Symphyotrichum species (asters) are among the latest plants to flower during the season. Consequently, asters risk not being pollinated because populations of insect pollinators decline as the season progresses. We examined the relationship between potential insect pollinators and three aster species: Symphyotrichum oolentangiense, S. novae-angliae, and S. ericoides. During August-September 2022, flower visitors for each species were assayed by recording all insect visits to focal groups of flowering stems over five minute intervals. A diverse set of generalist flower visitors was recorded, mostly flies and bees. Phenology of the three aster species was also recorded throughout the season. Compared to pollinator data from 2022, there was a large shift in the types of flower visitors observed. Honeybees were common in 2021 but rare in 2022. Thus the community of aster flower visitors can vary markedly among years; further research will investigate the causes of this variation.

This experience was funded by: William Muir Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 68

Ben Levine ’23

Major(s): Political Science/International Relations

Title: Advertising in Boston: Interning at MullenLowe U.S

This summer, I interned at MullenLowe U.S, an advertising agency in Boston. I worked as part of the account management team: This department acts as the go-between for the client and the other agency departments, like creative or strategy. As an intern, I was able to rotate and work in many different account teams, something I really enjoyed. I also loved living in and exploring Boston.

This experience was funded by: Solhem Business Fellowship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 69
Katrina Li ’23

Major(s): Computer Science, Mathematics
Other Authors/Contributors: Mitchell Anderson ’23, Sylvie Dirkswager ’25, Seth Dorchen ’24
Supervisor(s) and affiliation or institution: Anya Vostinar (Assistant Professor of Computer Science, Carleton College)

Title: How does symbiosis impact the evolution of complex behavior?

In nature, organisms have evolved many complex behaviors. This summer, we studied the evolution of complex behavior in computer programs, with a specific focus on the impact of symbiosis. Our experiments used a task system that gave the organisms energy for completing numerical tasks based on the difficulty of the task. Organisms with sufficient energy could reproduce, however there was a chance of mutation, leading to evolution by natural selection.

Symbionts and hosts could interact in mutualistic or parasitic ways, either (1) by aiding or hindering task completion or (2) donating/stealing resources from their partners. We analyzed the organisms’ population diversity and genome structure using the Shannon diversity index and measures for physical and functional modularity, with phenotypes based on the numerical tasks that organisms accomplished. We also tested both metrics and tasks in different conditions, such as requiring different amounts of energy for host and symbiont reproduction.

This experience was funded by: The Towsley Endowment for the Sciences and NSF grant No. 1750125

Presentation time: 5:45 - 6:30 p.m.
Poster number: 70

Yuxin Lin ’24

Major(s): Psychology

Title: Delving into Social Psychology Research at UNC-Chapel Hill

This poster introduces background knowledge about the project I was working on during the summer. It also presents my daily task and the three important skills I learned from the internship.

This experience was funded by: The Sam ’75 and Meg Woodside Endowed Fund for Career Exploration

Presentation time: 5:45 - 6:30 p.m.
Poster number: 71

Amber Lozoya ’23

Major(s): Sociology/Anthropology

Title: Children of Incarcerated Caregivers

This summer I was a family program intern at an organization named Children of Incarcerated Caregivers in Minneapolis. It is an organization that provides resources and opportunities to children who have parents currently in the carceral system or that have been impacted by it. I focused on many different tasks some of which included attending meetings, researching on other national and international organizations, and developing a program to pair college students who have ideally been impacted by the
carnal system, with children from the organization with the goal to build a long-term mentorship. I also attended meetings with my coworkers to develop resources for families impacted.

This experience was funded by: John ’55 and Bonnie Raines Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 72

Julia Luljak ’23

Major(s): English

Title: Northfield Public Library Internship

I worked at the Northfield Public Library, assisting with bilingual storytimes, creating a display for Hispanic Heritage Month, and facilitating conversation tables in both Spanish and English. A component of community outreach was included as well, since the library had a booth at the Riverwalk Market Fair and went to the local middle and high school summer school programs. I attended these events, learning more about the Northfield community and giving back to it.

This experience was funded by: Elizabeth and George Frost Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 73

Sachit Mallya ’23

Major(s): Economics

Title: Business Development Intern at Fluid Dev

Fluid Dev is a startup that aims to create a global talent platform that connects people from all across to companies in the US. The company explicitly targets roles in Robotics, Computer Vision, and Machine Learning as it is a niche in the job market. During my internship at Fluid Dev, I focused on accelerating business development and strategy initiatives to increase engagement with the targeted communities. The main aspects of my internships included increasing inbound traffic towards the website, conducting outreach to identify potential clients, securing meetings with clients, designing posters, and managing the ad campaign to increase website traffic. It was an enjoyable experience and I learned a lot about the talent industry through my supervisor and team members.

This experience was funded by: Dolores D. Oswald ’46 and Hanan D. Wedlan Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 59
Astrid Malter ’23

Major(s): Cinema and Media Studies

Title: The Ins and Outs of Service Dog Training

This summer I interned with Believet™ Canine Service Partners, learning how the nonprofit acquires, trains, and matches service dogs with disabled veterans. I created a video and took photographs for their social media.

This experience was funded by: Trace McCreary ’89 and Alissa Reiner Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 60

Nikki Marsh ’23

Major(s): Cinema and Media Studies

Title: My Summer with the Williamsport Crosscutters

This summer, I was a production intern for the Williamsport Crosscutters. The Crosscutters are a minor league baseball team from Williamsport, PA and they play in the MLB Draft League. During this internship, I directed a production crew, operated a switchboard and camera during the games, and filmed and edited videos that would be displayed on the video board and on social media. Being in charge of a production team allowed me to develop my leadership and problem-solving skills. I also operated the 3rd base camera for the MLB Little League Classic where my footage was used for the video board and a highlight reel made for the game. Working for Van Wagner and the Little League Classic prepared me to work in the fast-pace and frequently changing sports media environment.

This experience was funded by: Elizabeth and George Frost Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 61

Sam McCarty ’23

Major(s): Environmental Studies

Title: Permaculture Internship

I worked with a permaculture firm to design and implement a plan for renovating a site.

This experience was funded by: The Student Internships Endowed Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 74
Kelly McGucken ’23

Major(s): Computer Science

Title: Voice-Interactive Game Development for Education

This summer I worked virtually as a game developer intern at SayKid, a technology startup based in Minneapolis, Minnesota. SayKid is a company that utilizes voice-interactive technology to create a screenless product that helps kids learn. My main task was designing and developing two children’s games from scratch using a tool called VoiceFlow, which allows integration with Amazon’s Alexa tool. For my first project, my partner and I built a fully functional, voice-interactive Connect Four game. My second project was a voice-interactive music game that encouraged kids to strengthen their rhythm and beat-keeping skills. Throughout my internship at SayKid, I practiced my communication skills daily and became well-versed in navigating the etiquette of an online workplace via Slack, which will be useful skills for jobs I pursue in the future. I also learned how to use cutting-edge technology to contribute to a field that is still in development.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 62

Nadia McPherson ’23

Major(s): Cinema and Media Studies

Title: A Future-Oriented Nostalgia in German Cinema: Grün ist die Heide and Goodbye Lenin!

Nostalgia permeates German cinema since the advent of film. Due to several reinventions of the German state in the 20th century, Germany’s national cinema frequently returns to what is lost. Still, German film studies generally do not connect these nostalgic presences. Therefore, I suggest studying two configurations of Heimat, post-WWII Heimatfilme and post-Berlin Wall Ostalgie films together provides insight into films’ ability to deal with disruption, displacement, and the eventual formation of new shared identities. I explore this persistence of nostalgia by analyzing Grün ist die Heide (1951), made after the defeat and division of Germany; and Goodbye Lenin! (2003), which followed the collapse of communism in East Germany. Both films follow characters who come to terms with issues of identity attached to their threatened sense of home. The films focus on key aspects of the past that endure into the present, resulting in a nostalgia outfitted for the future.

This experience was funded by: Mellon Mays Undergraduate Fellowship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 63
**Ton Meesena ’23**

Major(s): Mathematics, Statistics

**Title: Minimizing Age of Processed Information under Unreliable Channels and Different Queueing Disciplines**

The freshness of real-time status processing of time-sensitive information is crucial for several applications, including healthcare monitoring and autonomous vehicles. This freshness is considered in this paper for the system where unprocessed information is sent from sensors to a base station over a shared, unreliable wireless network. The base station has a dedicated non-preemptive processor with a constant processing time to process information from each sensor. The age of processed information (AOPI) is the time elapsed since the generation of the packet that was most recently processed by a processor. Our objective is to minimize the expected, weighted sum of the age of processed information over an infinite time-horizon.

In this paper, we consider two common queueing disciplines—No queue and Single Packet queue—and design an Optimal Stationary Randomized policy and a Max-Weight policy for each discipline. We prove that, for any network setup, these policies achieve performance within a factor of 2 from the optimal.

This experience was funded by: The Kolenkow-Reitz Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 64

**Sydney Merrell ’24**

Major(s): Environmental Studies

**Title: WildEarth Guardians**

I worked with WildEarth Guardians, an environmental non-profit that does work across the western half of the US. Through this, I learned what working in an environmental non-profit entailed. I did a wide variety of work under the supervision of the major grants officer Lindsay Beidel.

This experience was funded by: Abigail Nesbitt and the Helen M. Golde ’85 Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 65

**Sidra Michael ’23**

Major(s): Art History

**Title: Black Aesthetics: The Black Arts Movement in Chicago and Los Angeles**

This research comparatively analyzes the art of the Black Arts Movement as it manifested in Chicago and Los Angeles. Through reading art historical texts, looking at the socio-political and cultural contexts of the areas, and analyzing artworks, I formulate conclusions about how and why the movement manifested itself differently in each area and how that affected art-making. The movement in Chicago
was quite militaristic and emphasized organization. This resulted in art that was community-based, collaborative, accessible, emphasized positive and mobilizing messages, and was aimed toward a wider Black audience. In Los Angeles, the focus was to carve out a space for Black artists in L.A.’s art world. The art that was produced was subtle, experimental, independently created, and meant for an “art” audience. Ultimately, I hope to show the diverse art of this movement and dispel stigmas around Black art being monolithic and synonymous with protest art.

This experience was funded by: Mellon Mays Undergraduate Fellowship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 66

Sidra Michael ’23

Major(s): Art History
Supervisor(s) and affiliation or institution: Jordan Rogers (Visiting Professor of Classics, Carleton College), Mark Robinson (Oxford University), Allison Emmerson (Tulane University)

Title: Garden Party Etiquette: A Stratigraphic Excavation of the Garden of Insula I.14 in Pompeii

I spent five weeks in Pompeii, Italy excavating a building in the Southeastern part of the city. Through this research, I gained valuable insight into both archaeological methods and how archaeological data can inform our understanding of the past. I was able to develop several important skills like how to work in a team and how to go head first into new experiences in new environments. I developed an understanding of garden archaeology and the ways archaeologists peel back the layers of history through archaeological methods like floatation and heavy fraction, processes used to uncover organic data from excavations—these processes were integral in understanding the garden of the building, where I was stationed. This opportunity provided me with invaluable experience and unique hands-on knowledge of garden archaeology.

This experience was funded by: The Carleton Humanities Center

Presentation time: 5:45 - 6:30 p.m.
Poster number: 75

Will Mirza ’25

Major(s): History

Title: Navigating the United States Judiciary System as a Legal assistant for a small firm

This summer I worked for a small law firm located in Detroit, Michigan. The firm I interned at represented working class families and employees in various labor disputes. The cases we handled most often revolved around unlawful termination, discrimination, and worker’s compensation. I was responsible for crafting deposition summaries, helping to build case theory, and drafting legal complaints, and subpoenas, as well as compiling evidence and witness testimony for various court motions.

This experience was funded by: John ’55 and Bonnie Raines Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 76
**Marjorie Mitalski ’24**

Major(s): History  
Supervisor(s) and affiliation or institution: Laura Goering (Class of 1944 Professor of Russian and the Liberal Arts, Carleton College)

**Title: Swans As A Dinner Dish?**

Swan was a staple of Medieval and Renaissance banquets, yet by 1650 it had virtually disappeared from European tables. The culinary landscape then began to shift, with European nation-states developing independent culinary practices. In France, swans vanished from cookbooks, while in England, recipes for swans continued to be copied and republished despite the fact that swans were not being consumed by anyone other than elites. Through a study of historical cookbooks and newspaper articles, we investigated the mechanisms by which the idea of eating swan was perpetuated over the centuries, eventually becoming firmly embedded in notions of British national identity.

This experience was funded by: The Carleton Humanities Center

Presentation time: 5:45 - 6:30 p.m.  
Poster number: 77

**Suad Mohamed ’23**

Major(s): Biology  
Supervisor(s) and affiliation or institution: Enis Kostallari (Mayo Clinic), Shalil Khanal (Mayo Clinic)

**Title: Blocking Glycolysis in Hepatic Stellate Cells Reduces Hepatic Fibrosis In-Vivo**

The aim of our study was to further understand the role of glycolysis in the onset of hepatic fibrosis.

We examined if the blocking of glycolysis in induced fibrotic mice via the knockout of the HK2 gene in their HSCs had any effect on the degree of hepatic fibrosis that develops within their liver tissue. We found that Inhibiting glycolysis in HSCs via the knockout of the HK2 gene significantly decreases the levels of hepatic collagen present in CCl4 induced fibrotic mice. Since collagen is a marker of hepatic fibrosis, the intervention of blocking glycolysis in HSCs results in reduced levels of hepatic fibrosis in-vivo.

This experience was funded by: Nini’s Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.  
Poster number: 67

**Lydia Montgomery ’24**

Major(s): English  
Other Authors/Contributors: Nina Bunn ’24

**Title: The Power of Conversation: Podcasting for Climate Justice**

This summer, I worked as a writing intern on the ecological podcast Chrysalis. Created by freelance filmmaker John Fiege, Chrysalis centers around nuanced discussions of how we can live in more
environmentally sustainable ways. The original series brings on a breadth of environmental thinkers, from Evangelical faith leaders to the former head of the NAACP’s Environmental and Climate Justice Program.

In addition to this original run of episodes, we’re also working on several new sub-series within the podcast, focusing on environmental poets, chefs, visual artists, and nonprofits. During my time as an intern, I worked extensively on the development of these new series; especially the latter two, Chrysalis Artists and Chrysalis Projects. In addition, I also worked writing social media posts and promotional articles.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 78

Henry Moshfeghi ’25

Major(s): Undecided

Title: **Summer Research: Retinopathy of Prematurity at Gemelli Hospital in Rome, Italy**

This past summer I travelled to Rome, Italy to conduct research at Gemelli Hospital. Under the supervision of Professor Dr. Domenico Lepore. I had the opportunity to see inside the Italian healthcare system and observe both clinics and surgical procedures in addition to my research. The research that I participated in was concerning the disease ROP.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 68

Noah Mueller ’23

Major(s): Chemistry
Other Authors/Contributors: Sara Abraha ’25
Supervisor(s) and affiliation or institution: Joe Chihade (Professor of Chemistry, Carleton College)

Title: **Making Parasitic Worm Proteins Without Bringing The Worms To Carleton**

The WHO classifies helminths as “Neglected Tropical Diseases” because the parasitic worms often infect people who live near the equator. These parasitic worms, including hookworms, roundworms, and others are estimated to affect about a quarter of the world’s population – especially in the developing world. For any organism to make proteins, it needs aminoacyl-tRNA synthetases (ARSs). ARSs attach the correct amino acid to their cognate tRNA. Since ARSs are crucial for life, if we are able to specifically block the parasite’s ARS, it cannot make proteins and will die, leaving the host unharmed due to evolutionary differences. To study the parasitic ARSs, we’ve purchased the DNA fragments, Gibson assembled the fragments into a plasmid, transformed into E. coli, and attempted expression. In previous work, expression of mitochondrial ARSs (mtARSs) has failed. This summer, we tried to identify the mitochondrial targeting sequences (MTSs), peptides that facilitate mtARS transport into the mitochondrion. The MTS is removed once transport is complete and is therefore not part of the functional protein. In expression experiments of non-native mt proteins in E. coli, the presence of MTSs tends to decrease the levels of expression, hence our goal has been to identify them and remove them before attempting expression.
Georgie Mukeshimana ’25

Major(s): Undecided
Other Authors/Contributors:
Supervisor(s) and affiliation or institution: Floriane Marie Nibakure (Founder and Executive Director, Nibakure Community Village), Viateur Nzabangamba (Manager, Nibakure community Village)

Title: Empowering women through a recreation center

My internship was to work with teen mothers in rural Rwanda to find possible ways of improving their living standards and promoting financial independences. I worked with 20 teen mothers living in poor conditions by teaching them sewing skills in order to be help them in earning income to support their children. The project also focused on designing workshops to educate teen mothers how to handle mental health illness like depression, etc.

This experience was funded by: Jean Phillips Memorial Internship Fund

Brodie Mutschler ’24

Major(s): English

Title: We Need Culture Change, Not Climate Change

Helped in the production of 31 episodes. I contacted potential guests, created research reports, generated potential questions, and edited episodes. I worked together with 4 other interns, helping to organize the work to ensure we finished production during the summer. Working tightly with John and the other interns I realized you don’t need a special degree to make a difference. You can be an activist from your bedroom.

Wanying Na ’24

Major(s): Biology
Supervisor(s) and affiliation or institution: Emily Carrington (Friday Harbor Laboratory, University of Washington)

Title: Distribution of Three Mytilus Species and Hybrids on San Juan Island, WA

Mussels are one of the most commercially cultivated marine bivalves worldwide and a widely studied organism in laboratories. Mytilus trossulus and Mytilus californianus are two species native to San Juan Island, WA. The non-native Mediterranean mussel Mytilus galloprovincialis was first imported into the
northeast Pacific for aquaculture, and is now broadly established. Researchers from Friday Harbor Laboratories of the University of Washington have been studying local mussel populations on San Juan Island, WA, as well as mussels from Penn Cove Shellfish, LLC. Morphological identification of species within the Mytilus genera could be unreliable, so it is of interest to identify Mytilus species used in research with a species-specific genetic marker. Using the Me15-16 marker on the adhesive foot protein gene, we found that all mussels from the farm were pure M. trossulus and M. galloprovincialis as labeled. In natural populations on San Juan Island, we found M. trossulus and M. californianus, as well as putative hybrids of M. trossulus x M. galloprovincialis.

This experience was funded by: The Kolenkow-Reitz Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 81

**Gisele Nelson ’25**

Major(s): Undecided
Other Authors/Contributors: Gitanjali Matthes ’25
Supervisor(s) and affiliation or institution: Eric Alexander (Assistant Professor of Computer Science, Carleton College)

**Title: Cloudy With a Chance of Data: Building a Research-Based Word Cloud Generation Tool**

A word cloud is a data visualization that encodes information about a text in the words themselves, often using a subset of the most common words to compare relative frequencies. Word clouds are popular, but they easily become less effective when font size, rotation, and color are misused, and, additionally, because of perceptual biases that are inherent in a visualization like this. We decided to create a research-based word cloud generator, choosing features that would target specific biases common in word clouds. Our tool includes features such as the capability of controlling maximum font size and padding, editing a list of stop words, and specifying a color scheme. We also include the ability to use lightness along with font size as a redundant encoding on word frequency, to split words into semantic groups, and to add either rectangular or circular bounding boxes around individual words.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 5:45 - 6:30 p.m.
Poster number: 82

**Quoc Nguyen ’23**

Major(s): Computer Science
Other Authors/Contributors: Conor Babcock O’Neill ’24, Cecilia Ehrlichman ’24
Supervisor(s) and affiliation or institution: Layla Oesper (Associate Professor of Computer Science, Carleton College)

**Title: Tumor Distance Measures**

A tumor is the result of an evolutionary process, selecting on somatic mutations that provide an advantage in tumorigenesis. These underlying tumor evolutionary histories can be inferred from sequencing data to construct tumor phylogenies. However, benchmarking these inference methods requires some notion of similarity between any two tumor phylogenies. Distance measures have been designed for this exact task, but there are a number of ways that existing distances can be improved. We
propose three approaches for such improvements: (i) a new distance measure that combines features of several existing distance measures; (ii) a new distance measure that utilizes novel information from the input trees; (iii) a framework for relaxing a key assumption, known as the infinite sites assumption, made by most previous distance measures. We demonstrate the effectiveness of our new approaches using simulated data.

This experience was funded by: NSF Grant

Presentation time: 5:45 - 6:30 p.m.
Poster number: 83

Zhanghan (Tony) Ni ’25

Major(s): Undecided

Title: Examining the Role of Alzheimer’s Disease in the Interaction Between Procedural and Deliberative Decision-making Systems

I worked as a research intern at the University of Minnesota in the Summer of 2022. I studied how Alzheimer’s disease affects the interaction between procedural and deliberative decision-making systems. We used a neuroeconomics task called Restaurant Row and various mice models of Alzheimer’s disease. I cleaned, analyzed, and graphed datasets from multiple sensors in Restaurant Row with MATLAB. I managed mouse colony, performing mating, weaning, microchipping, genotyping, euthanasia, and perfusion. I purified Aβ from mouse brains through a 4-step protein extraction for various lab projects. I performed immunofluorescence on brain slices from various lab projects and tested recently purchased antibodies.

This experience was funded by: Elizabeth and George Frost Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 70

Adam Nik ’23

Major(s): Computer Science
Supervisor(s) and affiliation or institution: Jie Fu (Principal Investigator, Beijing Academy of Artificial Intelligence (BAAI))

Title: Leveraging Self-Training in Causality Classification of Socio-Political Event Data

This paper details our participation in the Challenges and Applications of Automated Extraction of Socio-political Events from Text (CASE) workshop @ EMNLP 2022, where we take part in Subtask 1 of Shared Task 3. We approach the given task of event causality detection by proposing a self-training pipeline that follows a teacher-student classifier method. More specifically, we initially train a teacher model on the true, original task data, and use that teacher model to self-label data to be used in the training of a separate student model for the final task prediction. We test how restricting either the number of positive or negative self-labeled examples in the self-training process affects classification performance. Our final results show that using self-training produces a comprehensive performance improvement across all models and self-labeled training sets tested within the task of event causality sequence
classification. On top of that, we find that self-training performance did not diminish even when restricting either positive/negative examples used in training.

This experience was funded by: Sam ’75 and Meg Woodside Fund for Career Exploration

Presentation time: 5:45 - 6:30 p.m.
Poster number: 84

**Tiffany Nyamao ’25**

Major(s): Undecided

**Title: HealthPartners Neuroscience Research Internship**

HealthPartners Neuroscience Center conducts nationally recognized research on Alzheimer’s disease, Parkinson’s disease, stroke and other nervous system disorders (http://www.alzheimersinfo.org/AlzheimerInfo/welcome).

This internship offers exposure to clinical research for students to gain a better understanding of neurodegenerative and neurologic diseases.

As a possible biology major on the pre-med track, my goal this summer was to learn more about medicine in the lens of research.

This experience was funded by: Pommerenke Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 71

**Frances O’Grady ’24**

Major(s): English

**Title: District Attorney’s Office, Durham NC**

This summer I had the honor of working at the Durham North Carolina District Attorney’s office, thanks to funding from the Student Internships Endowed Fund. Working for District Attorney Satana Deberry was an incredibly rewarding experience. Deberry is one of the country’s most progressive DAs, and it was amazing to work where my values aligned with the mission of my employer. In the past two years, Deberry has lowered the jail population by 25%, reducing bail and declining to prosecute minor drug offenses, while shifting prosecutorial focus to violent crimes.

This experience was funded by: Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 85
Jack Ochoa-Andersen ’24

Major(s): History

Title: Applying a Liberal Arts Education to the Business World

I spent this past summer working as a research and data analysis intern at Cogent Consulting, a Minneapolis-based consulting firm that specializes in crafting innovative investment and business strategies for clients in accordance with their core values, placing particular emphasis on net positive impacts for local communities. Through my engagement in this experience, I noticed significant development in several professional and life skills, such as manners in which critical thinking frameworks I have developed through the History curriculum at Carleton can be applied in a professional setting.

This experience was funded by: Student Internships Endowed Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 72

Lindsay Okindo ’24

Major(s): Psychology
Supervisor(s) and affiliation or institution: Viann Nguyen-Feng (Professor of Psychology, University of Minnesota-Duluth)

Title: Early Maladaptive Schemas and Coping Responses of Children Receiving Services at a Child Advocacy Center

Early maladaptive schemas (EMS) are self-views that represent themes originating from childhood and are associated with unmet emotional needs and adverse experiences. EMS are maintained throughout life by unhelpful coping responses. However, it is unclear how the relationship between EMS and coping responses present in children who recently experienced abuse. The present study focuses on EMS in the context of childhood maltreatment in order to contribute to the limited literature on EMS and reinforce more helpful coping responses for children. Data were collected in collaboration with a child advocacy center through forensic interviews. Qualitative thematic analyses were utilized to see how EMS and coping responses were grouped together. Results revealed the excessive responsibility/standards schema was positively associated with self-sufficient coping and negatively associated with avoidant coping. Children reported engaging in socially-supported and self-sufficient coping more than avoidant coping, demonstrating an ability for children to cope in more helpful ways.

This experience was funded by:

Presentation time: 4:30 - 5:15 p.m.
Poster number: 73

Brett Olson ’24

Major(s): Art History

Title: Preserving Performance: A Summer at the Franklin Furnace Archive

During my time at the Franklin Furnace Archive I was responsible for several different tasks including writing for two weekly newsletters for an international audience of over 14k artists and supporters,
researching and creating a Wikipedia of information for our organization, including navigating challenges related to CreativeCommons laws and the arts ownership. Also grant writing, editing and research, including writing a proposal for the newly established 3 year /$150k Teiger Foundation grant

and finally researching Ray Johnson and our organization’s influence in the mail art community, among other known artists in our organization.

This experience was funded by: Student Internship Endowment Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 86

Arthur Onwumere ’24

Major(s): Biology

Title: The Hole In The Wall Gang Camp

During this past summer, I worked as a Program Facilitator at The Hole in the Wall Gang Camp, a SeriousFun Camp in Ashford, CT. The Hole in the Wall Gang Camp is a summer camp for children with special and chronic illnesses. Founded by the famous actor, Paul Newman, he created the camp to give sick children who spend most of their childhood in the hospital receiving care and treatment to be kids again even for just a moment. To allow them to forget they have a serious illness and explore the joy of going to a summer camp. His motto: Raise A Little Hell, would later shape the lives of many diagnosed children, their siblings, and staff members for 34 years with many more to come. My responsibilities as a program facilitator were to help facilitate our 3 core values: Teamwork, Advocacy, and Challenge By Choice. Allowing each camper to discover what those values meant to them and how they could implement them while at camp and after they leave camp into their communities.

This experience was funded by: Eric 85’ and Sue Munis 86’ Nord Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 87

Kanishk Pandey ’23

Major(s): Physics, Computer Science
Supervisor(s) and affiliation or institution: Ryan Terrien (Assistant Professor of Physics and Astronomy, Carleton College)

Title: Simulating the Magnetic Sensitivity of Spectral Lines

Exoplanets can be found by looking for doppler shifts of a star’s spectral line. However, it is hard to differentiate between magnetically-driven changes and doppler shifts. We implement a way to predict a spectral line’s sensitivity to magnetic field by modeling the line with a radiative transfer simulation. We retrieve approximately 8000 lines from the Vienna Atomic Line Database and simulate them using NICOLE, a spectral synthesis code. We investigate how the lines change by varying the temperature and magnetic field of the star, fitting the trends with a linear fit, and recording the slope, which acts as a proxy for sensitivity. The final line database provides a physically realistic prediction for how thousands
of spectral lines vary in the spectra of sun-like stars. It may also help decide which lines to observe when measuring doppler shifts line-by-line and lead to better measurements of magnetic field activity.

Presentation time: 4:30 - 5:15 p.m.
Poster number: 74

**Joseph Park ’25**

Major(s): Undecided

**Title: Developing a Head-Fixed Behavioral Paradigm to Analyze Hippocampal Spatial Coding Properties**

Hippocampal place cells work together to form a representation of a given environment yet the mechanisms of spatio coding are incompletely understood.

We aimed to obtain electrophysiology data from hippocampal cells in the CA1 region to better understand their spatial coding properties.

Neurotar Mobile HomeCage allows head-fixed mice to navigate through a circular track environment while performing electrophysiological recordings.

This experience was funded by: Sam ’75 and Meg Woodside Endowed Fund for Career Exploration

Presentation time: 5:45 - 6:30 p.m.
Poster number: 88

**Audrey Parrott ’25**

Major(s): Undecided
Supervisor(s) and affiliation or institution: Deborah Gross (Charles “Jim” and Marjorie Kade Professor of the Sciences, Carleton College)

**Title: Cooking-Induced Particulate Matter in Ethiopia: The Effects of Traditional Biomass Cookstoves**

A large amount of the global population relies on traditional biomass fuels such as charcoal or wood for cooking. The inefficient burning of these fuels results in significant amounts of indoor air pollution composed of particulate matter, or PM2.5, which harms human health. To better understand the emissions from these fuels, we collected PM2.5 data from charcoal and wood stoves in Ethiopian homes during cooking events. We also collected data from improved stoves that aim to produce fewer emissions. The eventual goal of our research is to compare traditional stoves with the improved stove; this poster focuses on trends in stoves burning traditional fuels. We found that the PM2.5 concentration of the traditional fuels greatly surpassed the 24-hour exposure guideline of 15µg/m3 set by the World Health Organization (WHO) in nearly all data sets, typically hovering around 30,000µg/m3 for hours at a time.

This experience was funded by: Summer Science Fellowship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 75
Astrid Petropoulos ’23

Major(s): Biology
Supervisor(s) and affiliation or institution: Rou-Jia Sung (Assistant Professor of Biology, Carleton College)

Title: NeuroPAL: A “PAL” for Identifying hot Gene Neuron Identities within the Ly6 Family

The Ly6 protein family is highly conserved among multiple species, including that of humans, Drosophila, and C. elegans. These proteins have previously been linked to processes such as odor sensing and regulation of receptor trafficking; however, very little remains known about the function of these proteins. Using the model of C. elegans to deduce the location of the Ly6 proteins, we are utilizing a tool called NeuroPAL in conjunction with transcriptional GFP reporters for each hot-gene of interest. NeuroPAL is a transgene that creates a color-coded atlas of the hermaphrodite C. elegans nervous system, and we have created a transgenic C. elegans model that contains both the NeuroPAL transgene and the GFP-tagged hot-1 gene. Employing confocal microscopy, we are able to use this model to visualize the exact location of each GFP-tagged neuron for each hot gene. Moving forward, we hope to use this anatomical information to develop behavioral assays.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 4:30 - 5:15 p.m.
Poster number: 76

Benjamin Pham ’23

Major(s): Biology

Title: Expanding Diversity, Equity, and Inclusivity in the Portland VA Hospital System and Shadowing the General Surgery Department

Examined strategies to develop Diversity, Equity, and Inclusivity (DEI) in the VA Hospital System to establish hospitals as High-Reliability Organizations (HROs). Shadowed General Surgery Department of the Portland VA Hospital during this research.

This experience was funded by: Sam ’75 and Meg Woodside Endowed Fund for Career Exploration

Presentation time: 5:45 - 6:30 p.m.
Poster number: 89

Kevin Phung ’23

Major(s): Computer Science, Economics

Title: Consulting – with EY-Parthenon in Boston

Over the summer, I was a summer associate with EY-Parthenon’s Software Strategy Group. Throughout the internship, I worked with several teams to conduct due diligences on various software companies and software-enabled businesses for large private equity firms.
Aldo Polanco ‘23

Major(s): Art History, Computer Science

Title: Working as a software engineer at Slack Technologies

As part of Slack as a software engineer in Notifications back-end team, built push notification error logging system, creating Grafana dashboards linked to Prometheus metrics. Undertook ‘Customer Love’ project from beginning to end, fixing issues within the notification system which clients specifically asked for.

This experience was funded by: Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 77

Michaela Polley ‘23

Major(s): Chemistry, Mathematics
Supervisor(s) and affiliation or institution: George Schatz (Charles E. and Emma H. Morrison Professor of Chemistry and of Chemical and Biological Engineering, Northwestern University), Subhajyoti Chaudhuri (Postdoctoral Fellow, Northwestern University)

Title: Reverse Engineering Mass Spectrometry

Mass spectrometry is a widely used technique in the identification of chemical compounds. Most often this consists of comparing an unknown spectrum to a dictionary of known spectra. However, when the compound of interest is novel and no known spectra exist, mass spectrometry analysis becomes significantly more challenging. In this project, we developed a procedure to propose a structure based solely on the chemical reactants and mass spectrum peak values without relying on known spectra. Our procedure combined graph theory to determine possible bonding structures, combinatorics to determine ligand combinations, and density functional theory calculations to determine the most stable isomer of a given molecular combination. Using our procedure, we were able to propose a structure for one of the peaks in our unknown spectra and make progress toward identifying multiple other peaks.

This experience was funded by: Summer Science Fellows Program, Office of the Provost

Presentation time: 5:45 - 6:30 p.m.
Poster number: 91

Nithin Poreddy ‘25

Major(s): Undecided

Other Authors/Contributors:
Supervisor(s) and affiliation or institution: Steven H. Lin (University of Texas MD Anderson Cancer Center), Chen Braun (University of Texas MD Anderson Cancer Center)
Title: Radiation Treatment Reduces Histone Deacetylase Inhibitor Immune Response

This study explored whether the HDAC (histone deacetylase) inhibitors Vorinostat and Belinostat could enhance radiation-induced type 1 interferon expression and be used in conjunction with radiation to indirectly kill cancer cells. Wild-type HEK293 cells and IFNb1-transfected, LKB1-mutated HEK293 cells were used in luciferase assays to compare IFNb1 expression between naturally-occurring and cancer-like cells under drug influence. A549 lung cancer cells were used in RT-qPCR and a clonogenic cell survival assay to validate results and test drug and radiation effects on cell survival. The luciferase assays indicated that radiation suppressed the immune response of HDAC inhibitors. RT-qPCR indicated similar results. The survival assay indicated an insignificant reduction in cell colonies. These results may serve as a caution against using certain HDAC inhibitors with radiation as a treatment method. Further experimentation could first focus on validating this effect in other HDAC inhibitors and then researching the biological mechanism behind this effect.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 92

Isabella Pozzi ’23

Major(s): Biology
Supervisor(s) and affiliation or institution: Rou-Jia Sung (Assistant Professor of Biology, Carleton College)

Title: Developing Behavioral Assays to Study ly6 Protein Function in C. elegans

The Ly6 protein family is of interest due to its structural similarities to alpha neurotoxins and the mammalian Lynx1’s interactions with nicotinic acetylcholine receptors. In C. elegans, the Ly6 protein family consists of odr-2 and its homologs, which are known as hot genes. Our long term goal is to determine the function of hot genes by creating knockout mutants, running behavioral assays, and comparing wild type behavior to our hot gene mutant behavior. Here we focus on developing assays that could be beneficial for studying hot-3 function. To do this we first have to determine if we can perform the behavioral assays in our lab. Egg laying assays and chemotaxis assays run in lab with wild type (N2) worms and odr-2 knockout mutants (CX2304) show behavior approximates previously reported findings. This demonstrates that these assays can be run in our lab, although further optimization is necessary before we can begin to run the aforementioned assays with hot gene knockout worms.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 5:45 - 6:30 p.m.
Poster number: 93

Sophie Prichard ’23

Major(s): Biology

Title: Alaska Court System Internship

I worked as a court case manager in the Probate Department of the Alaska Court System. This position entailed filing documents into the database, opening and closing cases, and motion tracking. I worked on Guardianship/Conservatorship, Estate, Adoption, and Children in Need of Aid cases. In addition, I participated in extra activities, including sitting in on Grand Jury, listening to talks given by judges, and eating good food at the company potluck.
This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 78

Grace Prince ’25

Major(s): Undecided

Title: Soil Texture Analysis of Metro Area Urban Forests

Urban forests are hugely important to ecosystems, human health and wellbeing but are increasingly under threat due to urbanization, invasive species and climate change. The goal of this summer’s project was to assess the health of urban forests across the Twin Cities Metro Area utilizing a mix of in-field observations and remote sensed data to eventually be able to predict forest patch habitat quality across the Twin Cities.

The first part of in-field data collection included soil collection and regional parks across the 10-county metro area. I chose to focus on soil texture analysis of the collected soils utilizing the hydrometer method. Based on the levels of sand, clay, and silt within the soil samples, I was then able to classify the soil samples based on the soil texture triangle. Finally, the bedrock makeup of the urban forest patches were identified in order to gauge if there was correlation between bedrock composition and soil classification.

This experience was funded by: Independent Research Fellowship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 79

Tony Qiang ’23

Major(s): Chemistry, Computer Science

Title: Isotope tracing to quantify differences in lipids metabolism in a β-catenin driven THLE cell model of hepatocellular carcinoma

Hepatocellular carcinoma (HCC) is one of the most lethal cancers and yet remains largely inaccessible to both immuno and targeted therapies. In one-third of human HCCs, tumors contain mutations that activate the WNT/ β-catenin pathway, a developmental pathway that controls a large set of metabolic and signaling pathways. Many metabolic pathways contribute to tumorigenesis, but in liver cancer lipid metabolism has been described as potentially playing an outsized role. While it is known that key master transcriptional regulators of lipid metabolism are targets of β-catenin, the precise alterations in lipid fluxes that are induced by mutant β-catenin signaling are unknown. To reveal the metabolite reprogramming affected, we studied the non-transformed liver cell line THLE with and without an inducible transgene encoding mutant β-catenin. We studied phospholipid metabolism by tracking metabolite labeling from stable isotope tracers. In our experiments, we treated activated β-catenin THLE cell lines with isotope-labeled choline, ethanolamine, and serine and harvested the cells after 24 hours to determine lipid production fluxes. After the extraction of lipids from the harvested cells, the LCMS results of the lipid metabolites were compared with the results of the controlled group. We found that β-catenin-activation significantly decrease Phosphatidylcholine (PC) fluxes, suggesting that key enzymes controlling this metabolism are affected by β-catenin. Our study will help us better understand the landscape of changes in lipid metabolism in HCC and support the future validation of lipid metabolism as a therapeutic target in this tumor type.
This experience was funded by: Class of 1964 Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 94

**Xiaoying Qu ’25**

Major(s): Undecided

**Title: Documentary Production Assistant at Guggenheim Production Inc.**

Grace Guggenheim is a sole proprietor documentary filmmaker who has specialized in long format historical documentaries. Grace also stewards a depository that is housed with the Academy of Motion Picture Archive and Library in Los Angeles, CA. Grace has produced documentaries and oral histories, in addition to digitally remastering older films for distribution and educational purposes.

Interns will be exposed to a variety of technical knowledge and production skills. The essential learning is understanding firsthand the poetic storytelling and art form of the films created within the depository, that primarily address major and little known American History events. Site visits with museums and monuments within Washington, DC will be interwoven as they relate to our documentary subject matter.

Interns will also be exposed to production work in Grace’s current project, a film short on Neile Adams McQueen, the first wife of Steve McQueen—the theatrical actor. On and off site stock still and footage research will be involved, as will exposure to copyright and licensing media management, digital scanning and inventory techniques.

Interns will work with Grace in an office situated in the heart of Georgetown, located in our Nation’s Capital, Washington, D.C., in a sunny industrial warehouse building.

This experience was funded by: Class of 1963 50th Reunion Fund for Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 95

**Alek Rabago ’23**

Major(s): Chemistry
Other Authors/Contributors: Deborah Gross (Charles “Jim” and Marjorie Kade Professor of the Sciences, Carleton College)

**Title: Cooking-Induced Particulate Matter in Ethiopia: Improving Stove Performance**

A large portion of the world’s population relies on biomass fuel sources. Stoves that utilize these fuels produce large amounts of particulate matter, which in turn leads to adverse health effects. Designing and implementing more efficient cookstoves presents a potential solution to this problem. Our research focuses on the development and characterization of improved charcoal stoves and wood pellet stoves. The stoves are measured in terms of their overall thermal efficiency, as determined by how much fuel they use to boil a known amount of water, and in terms of the concentration of PM2.5 generated when they are used under typical household conditions. The stoves are deployed in the field for testing in Ethiopian kitchens, where their PM2.5 emissions are measured. We find that the improved pellet
burning stoves operates at ~60% OTE and the improved charcoal at ~30% efficiency (as compared to ~20% and ~10-12% for traditional charcoal and wood stoves, respectively). The main goal of the project is to test our hypothesis that these improved cookstoves emit less than traditional cook stoves and cook more efficiently.

This experience was funded by: Ferrett Research fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 80

Daanyal Raja ’25

Major(s): Undecided

Title: Sorting and Analyzing Patient Data With Python

I spent my summer working at the Stanford Oncology Department in Palo Alto, California. I worked under Dr. Lucas Vitzthum, and was tasked with creating a code that could read excel files filled with patient data, and in turn print out a brand new excel document with the approximate diagnosis date, number and location of cancerous nodes, and patient ID’s for every single patient. Throughout the summer, I spent a significant amount of my time learning about the various python modules I could use to accomplish this task, with each module essentially being a new language which provides unique commands. After selecting multiple python modules, I began outlines of my code, and slowly worked towards a final product that can sort through an excel page with 70,000 rows in less than 15 seconds.

This experience was funded by: The Sam ’75 and Meg Woodside Endowed Fund for Career Exploration

Presentation time: 4:30 - 5:15 p.m.
Poster number: 81

Moira Rankin ’25

Major(s): Biology

Title: Wildlife Veterinary Medicine Internship at Rescue Center Costa Rica

I spent six weeks in Alajuela, Costa Rica working at an animal hospital situated in a wildlife rescue center. Our rescues consisted mainly of injured animals hit by cars or attacked by neighborhood pets as well as infant animals who were rejected or fell from their mothers’ backs. The wildlife I handled and treated ranged from coatis, sloths, anteaters, raccoons, and monkeys, to turtles, parrots, toucans, possums, and porcupines. My shifts in the wildlife animal hospital lasted from 8 to 16 hours depending on emergency rescues, the ever-changing health conditions of our patients, scheduled procedures, and the need for constant observation. Under the supervision of professional veterinarians and veterinary interns, I used this internship to immerse myself in the wildlife conservation discipline of veterinary medicine; to discover whether it was a pathway I wanted to pursue.

This experience was funded by: Class of 1963 50th Reunion Fund for Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 96
Sophie Rast ’24

Major(s): Studio Art, Psychology

Title: History 432, “U.S. Society, Politics, and Culture, 1980-2040”

I spent the summer helping to develop a multidisciplinary senior seminar. As a Core Integration Seminar (CIS) at Gonzaga University it engages the year four question “Imagining the Possible: What is our role in the world?” The class encourages seniors to reflect on their role in the world now and moving forward. It challenges students to consider why future generations need us to be what Jonas Salk called: “good ancestors.”

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 82

Becca Riess ’23

Major(s): Political Science/International Relations

Title: Internship at Acumen Public Affairs in Brussels

I did a 6 week long internship at Acumen Public Affairs in Brussels, Belgium. Acumen is a consulting agency that public affairs services focusing on EU policies and events to a large range of clients. As a part of the sustainability team, I was able to work with clients such as Uber, Backmarket, Cargill, and many more. My role included helping in research, analyzing EU policy documents, stakeholder mapping, writing MEP briefings, and crisis management. I had an amazing time getting an introduction the consulting world all while being right next door to where EU policy decisions were being made in real time to deal with todays crises.

This experience was funded by: Raymond Plank Chair in Incentive Economics Funding for Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 97

Scout Riley ’23

Major(s): Cinema and Media Studies

Title: Emily Chez Paris: Interning on the hit Netflix Show Emily in Paris

I interned on the show Emily in Paris for the third season, performing the role of a production assistant. I completed crucial paperwork, filed papers, ran errands, and delivered scripts to set. Given the bilingual nature of this experience, I also navigated working in two languages, and with both French and American producers.

This experience was funded by: Abeona Endowed Fund for International Internships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 83
**Daven Rock ’23**

Major(s): Biology  
Supervisor(s) and affiliation or institution: Nels Elde ’95 (Associate Professor of Human Genetics, University of Utah), Michelle Culbertson (MD/PhD Student, University of Utah)

**Title: The Cytotoxicity of Viral Restriction Factor retroCHMP3 in Saccharomyces cerevisiae**

The ESCRT (endosomal sorting complex required for transport) pathway is a key cellular mediator of cargo delivery to the lysosome and cell abscission but is also used by retroviruses, such as HIV, for viral budding and release. RetroCHMP3 (charged multivesicular body protein 3) is a newly discovered viral restriction factor that blocks viral budding via the ESCRT pathway. However, due to the key role of the ESCRT pathway in membrane trafficking, blockage of the pathway by retroCHMP3 has also been found to be slightly cytotoxic. The current study examines the extent of retroCHMP3 cytotoxicity in Saccharomyces cerevisiae (yeast) and potential compensatory evolution of the CHMP genes to improve cell viability. The cytotoxicity of retroCHMP3 and related CHMP proteins was assessed in yeast by spot assay. Furthermore, an experimental evolution analysis was conducted whereby growth rate, compensatory mutations, and gene duplications were assessed over time in yeast expressing a highly cytotoxic, dominant negative form of retroCHMP3. This project advances the current understanding by identifying mechanisms through which the highly conserved ESCRT pathway can selectively restrict viruses while maintaining cell viability.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 4:30 - 5:15 p.m.  
Poster number: 84

**Brenna Russell ’24**

Major(s): Biology

**Title: Blood Brain Barrier (BBB): In-Vitro Characterization of UNCSB-Encoded Plasmids**

The Blood Brain Barrier (BBB) is an important regulator in controlling the flow of nutrients and neurotoxins between the brain and the rest of the body. The BBB is composed of specialized endothelial cells (ECs) that contain UNCSB, a transmembrane receptor that when coupled with Netrin-1, mediates the Wnt/B-catenin signaling pathway. An upcoming study in transgenic mice will be conducted to determine the effectiveness of Netrin-1 injection in ECs containing mutant UNCSB encoded plasmids to restore leakage of the BBB. In preparation for this upcoming study, new transgenic mice models with modified UNCSB regulation must be developed. During my internship, the purpose of my experiment was to verify that these newly encoded plasmids are the correct composition using In-Vitro COS-7 cells, before the plasmids are injected into the embryos of transgenic mice.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 4:30 - 5:15 p.m.  
Poster number: 85
Caroline Saksena ‘23

Major(s): Biology

Title: Diagnosing Healthcare’s Weaknesses through Public Health

In the summer of 2022, I interned with Mission: Cure, a public health non-profit organization. Mission: Cure is accelerating a cure for the rare disease pancreatitis. It is a patient advocacy organization that collaborates with clinical researchers, care providers, patients, policymakers, and impact investors to tackle barriers to progress head-on. Mission: Cure holds stakeholders accountable. In my internship, I had the privilege to research why a patient faces difficulty when seeking an accurate medical diagnosis. A second highlight was preparing for and attending my first national conference, PancreasFest.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 98

Adi Satish ’23

Major(s): Biology
Other Authors/Contributors:
Supervisor(s) and affiliation or institution: Eric Hoopfer (Assistant Professor of Neuroscience, Carleton College)

Title: Investigating the neural circuitry of social motivation in Drosophila melanogaster

We investigated the neural circuitry underlying male courtship behavior in Drosophila melanogaster. Previous work has shown that P1 neurons in male flies are activated by female stimuli which promotes a persistent internal state that drives male aggressive and courtship behaviors. Optogenetic activation of P1 neurons promotes reward behaviors including place preference and appetitive conditioning in males, suggesting the activity of P1 neurons is rewarding. pCd neurons are activated by P1 neurons and are required for the maintenance of the persistent internal state that drives social behavior. To determine whether pCd neurons also mediate reward, we tested whether the activation of pCd neurons alone could produce reward behaviors. We found that the activation of pCd neurons was not sufficient to impart place preference or negative-geotactic preference, suggesting that another neuronal population may mediate the P1 reward properties.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 5:45 - 6:30 p.m.
Poster number: 99

Victoria Semmelhack ’25

Major(s): Undecided
Other Authors/Contributors: Emmett Forster ’24, Kyra Landry ’24, Bee Candelaria ’24, Amelie Cook ’25
Supervisor(s) and affiliation or institution: Alex Knodell (Associate Professor of Classics, Carleton College)

Title: Small Cycladic Islands Project 2022
The Small Cycladic Islands Project is an archeological project led in Greece that seeks to identify a history of occupancy and patterns of use in the smallest Greek islands in the Aegean Sea. This year, the project focused on the islands around Milos, and mainly on the smaller island of Polyaigos (Figure 1). We collected material remains in the field and analyzed them in the lab. We found evidence of pottery, stone tools, and human-built structures. Along with local interviews and historical records, we developed a better understanding of how this island was occupied throughout history, and could ascertain the long-term role these islands played within the Greek Cyclades.

This experience was funded by: US National Science Foundation Senior Archaeological Research Grant. Award ID: 2150873

Presentation time: 4:30 - 5:15 p.m.
Poster number: 86

**Shelly Seth ’23**

Major(s): Biology

**Title: Clinical Research Internship at HealthPartners Neuroscience Center**

This summer I had the amazing opportunity of interning at HealthPartners Neuroscience Center as a Clinical Research Intern. I assisted my PI/supervisor with various clinical trials/studies that she was running. Among these studies, I was most involved in a Exercise Rehabilitation for Spinal Cord Injury study, acupuncture for mild Traumatic Brain Injury, acupuncture for Myasthenia Gravis study, and RAPID AI Stroke Study. I also obtained consent from patients to be involved in an ALS Registry to assess the quality of life, and helped co-write a manuscript for Potentially Preventable Readmissions from acute inpatient rehabilitation. I was able to be involved in many studies and explore my academic interests with the help and flexibility of my supervisor. I would like to acknowledge and thank the Multicultural Alumni Network (MCAN) for giving me the opportunity to pursue this internship.

This experience was funded by: Multicultural Alumni Network

Presentation time: 4:30 - 5:15 p.m.
Poster number: 87

**Ted Shao ’25**

Major(s): Undecided
Other Authors/Contributors: Gabby Reynaga ’23

**Title: Double Trouble: Having Access to Two Males Concurrently During Mating Does Not Affect Female Rat Mating Behavior**

In a conventional setting, female rats gain access to one male at a time. Granting her access to two males at the same time, the present study tested 1) whether female rats’ mating behaviors change when two males are available concurrently and 2) whether female rats will exhibit preference for one male over the other. On test day 1, female rats were tested when she gains access to one male at a time until she receives 15 stimulations. On test day 2, female rats were tested when she gains access to two males at a time with the same pair of males from test day 1 until she receives two ejaculations from the same or different males. No significant differences in contact return latencies to mount, intromission and ejaculation were found. Female rats did not consistently display a preference for a certain male. However, under two males at a time condition, female rats received more intromission before they received their first ejaculation which may reflect it’s more rewarding.
This experience was funded by: NIH grant

Presentation time: 5:45 - 6:30 p.m.
Poster number: 100

**Lucy Shapiro ’23**

Major(s): Chemistry

**Title: Food Access Programs Internship at Food For Free**

This summer, I worked at Food For Free, a non profit organization based in Cambridge, MA. Food For Free’s mission is to improve access to healthy foods and rescue foods that would otherwise be wasted. As an intern, I helped manage volunteers, led meal packing volunteer sessions, and researched and communicated with new partner agencies including hospitals, universities, and Adult Learning Centers. At the end of my experience, I composed a blog post regarding my experience throughout the summer and one of my greatest takeaways- the importance of creating a food access model that emphasizes choice and provides community members with culturally relevant foods.

Presentation time: 4:30 - 5:15 p.m.
Poster number: 88

**Frank Sheffield ’24**

Major(s): Chemistry

**Title: The Architectural Effect of Genetic Mutations in S-locus region of Soybeans**

Soybean (Glycine max), has a variety of genes within its genome that can affect traits such as seed composition, stress resistance, and architecture. When focusing on the trait of architecture, we must identify the genes that affect this trait. A major locus that controls soybean height is known as the S-locus. A recent study found that the S-locus is defined by a cluster of gibberellin 2-oxidase 8 (GA2ox8) genes. There are two base copies of this gene (named here as S1 and S2) that can be amplified to greater numbers in some soybean varieties. The varieties with more copies tend to be shorter, due to the enhanced activities of the GA2ox8 genes deactivating the hormone gibberellin. CRISPR-Cas9 methods were used to produce a series of out-of-frame and in-frame mutations in the GA2ox8 genes of soybean variety Williams 82. However, since Williams 82 has several copies of the GA2ox8 genes, identifying the new mutations and their effect on plant architecture is a complex problem. My research focuses on identifying the CRISPR-generated mutations in these plants and analyzing their inheritance patterns. We extracted tissue and DNA from 32 such plants. We then performed PCR on the DNA to amplify the different S1 and S2 alleles. The PCR products were subcloned and grown in colonies of E. coli cells. Once colonies were present, PCR was performed on individual colonies and Sanger sequencing was used to analyze the mutations. After completing these tasks, we then compared the gene sequence of our extracted plants to the unedited gene sequence of control Williams 82 plants. Although we are still awaiting results, we can predict that the cause of the difference in the architecture of plants is likely due to the out of frame 7, and 17 base pair deletion within the S-locus region of the gene. This mutation was present along with a 36 base pair insertion in both mutated lines of the plants.

This experience was funded by: Multicultural Alumni Network

Presentation time: 4:30 - 5:15 p.m.
Poster number: 89
Ming Shen ’23

Major(s): Biology
Supervisor(s) and affiliation or institution: Abby Olsen (University of Pittsburgh)

Title: Determining a Pathological Model for Parkinson’s Disease Using Drosophila

The aggregation of alpha-synuclein, a protein responsible for various nervous system functions, plays a crucial role in the progression of Parkinson’s disease (PD). As such, we wanted to investigate two questions: 1) whether alpha-synuclein mediates gastrointestinal symptoms in a fly model of PD and 2) if alpha-synuclein regulates gene expression. Alpha-synuclein is thought to cause gastrointestinal problems like constipation, which frequently affects PD patients prior to the onset of motor deficits. To assess whether constipation can act as a biomarker, we performed behavioral assays at days 1, 3, and 10 post-eclosion in flies expressing alpha-synuclein in all neurons. Inconclusively, we saw neither constipation nor motor deficits at days 1 and 3. We also explored transcriptional targets of alpha-synuclein, as gene expression in glia and neurons changes in the presence of alpha-synuclein. Through motif enrichment analysis, we found that glial alpha-synuclein was associated with the upregulation of proteins involved in proteolysis.

This experience was funded by: Trace McCreary ’89 and Alissa Reiner Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 90

Mika Shiffman ’25

Major(s): Undecided

Title: Assisting Staffers in a Senate Office

This summer, I worked as a Legislative Intern for the Office of Senate Majority Leader Charles Schumer in Washington, DC. As part of this internship, I assisted the Senator’s staff by answering phone calls and voicemails from constituents on a variety of topics, giving tours of the Capitol, sorting mail, and escorting guests around the Senate buildings. In addition, I wrote memos for meetings and committee hearings I had attended, conducted research for legislative staff, helped prepare materials for the Senator’s archives, and worked on other small projects. I also had the opportunity to witness key floor votes in the Senate that took place this summer and got to see my office working to successfully pass important legislation, including the PACT Act (twice), the Safer Communities Act, CHIPS, and the Inflation Reduction Act.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 91

Elijah Shore ’23

Major(s): Chemistry
Supervisor(s) and affiliation or institution: Steven Kass (Professor of Chemistry, University of Minnesota)

Title: Creating Chiral Solvents for Enantioselective Organocatalysis
The unique stereoisomeric configuration of a molecule can have a profound effect on its function. As such, there is a high demand for synthetic techniques that can achieve high enantiomeric excess (ee) without costly purification steps. Asymmetric organocatalysis typically achieves its chirality through the sole contribution of a chiral catalyst. A potential way to enhance the enantioselectivity of an asymmetric reaction is through the use of a chiral solvent. Synthetic methods for the creation of 3 chiral solvents are described here, along with optimization techniques for producing the highest possible optical activity.

This experience was funded by: The Kolenkow-Reitz Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 92

**Phoebe Sinner ’24**

Major(s): Biology

**Title: Molecular Mechanisms of Immunosuppressant-Induced Attenuation of Binge Alcohol Drinking**

We have shown that immunosuppressants that act through the inhibition of calcineurin (CLN) reduce alcohol intake in mice. We have further shown that this effect is a brain mediated mechanism. Calcineurin is an abundant phosphatase in brain and plays a key role in the transcription of both neuroinflammatory as well as stress signaling molecules. It is still unclear which cell types and pathways in brain are responsible for this immunosuppressant effect. One strategy to help decipher which cell types and brain regions are responsible, involves the use of conditional transgenic models. To this end we have developed a line of mice in which CN is knocked out in a significant population of neurons. We are now characterizing the extent and effects of this CN knockout on binge alcohol consumption.

This experience was funded by: Sam ’75 and Meg Woodside Endowed Fund for Career Exploration.

Presentation time: 4:30 - 5:15 p.m.
Poster number: 93

**Muno Siyakurima ’24**

Major(s): Computer Science

**Title: Company Registration in Harare through Virtual Corporate Services**

As a Data Analyst Intern my main project throughout my internship was looking at the company registration data of the past year and consolidating this data to come up with conclusions on the industries which these companies belonged in and also how this linked to the current economic situation of the city/country.

This experience was funded by: Multicultural Alumni Network

Presentation time: 5:45 - 6:30 p.m.
Poster number: 101
**Turiya Smith ’24**

Major(s): American Studies  
Supervisor(s) and affiliation or institution: Daniel Groll (Professor of Philosophy, Carleton College), Cherlon Ussery (Associate Professor of Linguistics, Carleton College)

**Title: Stand Your Ground Laws & The Racial Contract**

In 2005, the first Stand Your Ground Law was imposed in Florida. This type of legislation, which has spread throughout the US, allows citizens to enact bodily harm, including fatal attacks, if there is perceived threat. While the law does not reference race, evidence suggests that when this law is used in court it discriminates against Black victims, allowing white perpetrators to kill black people without consequence at a higher rate than when the roles are reversed. Analyzing the historical context surrounding the spread of Stand Your Ground Laws since 2005, I demonstrate that these laws are present day instantiations of the Racial Contract. Charles Mills’ The Racial Contract exposes the intricacies of the contract, one being that it outlines the morals of (most) white people. Therefore, the white moral consciousness can be analyzed by conceptualizing the SYG laws as part of the historical record of the Racial Contract.

This experience was funded by: Mellon Mays Undergraduate Fellowship

Presentation time: 4:30 - 5:15 p.m.  
Poster number: 94

**Matthew Smith-Erb ’23**

Major(s): Computer Science  
Other Authors/Contributors: Cathy Guang ’23  
Supervisor(s) and affiliation or institution: Layla Oesper (Associate Professor of Computer Science, Carleton College)

**Title: Deriving Tumor Consensus Trees Using Integer Linear Programming**

The acquisition of somatic mutations by a tumor can be modeled by a type of evolutionary tree. However, even with modern DNA sequencing technology, it is impossible to observe this tree. We introduce The Weighted m-Tumor Tree Consensus Problem to find a consensus tree among multiple plausible tumor evolutionary histories, each assigned a confidence weight, given a specific distance measure between tumor trees. We present an algorithm based on integer linear programming (ILP) which finds a spanning tree that minimizes the weighted distance to all input trees. Our simulated experiments show that our model outperforms past methods at finding a median tumor tree when using a particular tumor tree distance measure. When run on real data from one patient with Triple-Negative Breast Cancer, we find the output from our model better represents the input trees than an existing approach.

This experience was funded by: NSF Grant

Presentation time: 5:45 - 6:30 p.m.  
Poster number: 102
Natalie Soehnlin ’23

Major(s): Physics
Other Authors/Contributors: Lindsey Youngblood ’23
Supervisor(s) and affiliation or institution: Cindy Blaha (George H. and Marjorie F. Dixon Professor of Physics and Astronomy, Carleton College)

Title: Using Emission Lines to Determine the Triangulum Galaxy’s Evolutionary History

Certain emission lines of ionized gas can give important information about a galaxy’s evolution. Looking at galaxies, such as M33, the emission regions in Hα, [OIII] and [SII] can show if stars are actively forming (baby stars), if there is a planetary nebula (middle aged stars), or if there was a recent supernova (recently deceased stars). We modified a catalog of M33 emission regions to add in S2 planetary nebulae, PN, and reclassified previously mislabeled PN regions. Using these PN, we developed a planetary nebula luminosity function and calculated a distance of approximately 880 kpc to M33, which is within the expected and accepted range of values.

This experience was funded by: NASA Minnesota Space Grant College Consortium

Presentation time: 4:30 - 5:15 p.m.
Poster number: 95

Charles Solomon ’25

Major(s): Undecided
Supervisor(s) and affiliation or institution: Austin Mason (Lecturer in History, Carleton College)

Title: The Migrants’ Chronicles: 1892

This summer, I worked with Austin Mason, Director of Digital Arts & Humanities at Carleton, on The Migrants’ Chronicles: 1892, an educational video game to teach middle-school-age children about historical immigration to the US being developed in conjunction with the University of Luxembourg and Cologne Game Lab at Technische Hochschule Köln. My work primarily focused on researching cross-US transportation routes, especially rail and steamship routes, that migrants would have used. I categorized transportation times, costs, and distances for programmers to input into the game. I also digitally mapped said routes using ArcGIS software, noting transit hubs and final destinations for migrants. I learned skills such as how to work and coordinate with an international team, how to collect and organize historical data, and how to present such data with digital mapping tools.

This experience was funded by: Humanities Center

Presentation time: 5:45 - 6:30 p.m.
Poster number: 103

Brayden Stark ’24

Major(s): Political Science/International Relations

Title: Innovation and International Relations

I had the opportunity to intern at the European Institute of Technology (EIT), the innovation branch of the EU. Specifically, I worked at the EIT Hub Israel, which seeks to provide innovative solutions to global
challenges. EIT assists in start-up scaling and offers educational opportunities for corporates and ambassadors. I conducted start-up scouting, looking for companies that provide unique solutions to various global challenges to have them apply for the collaboration programs. I also assisted with research ranking the most innovative cities in Central Eastern Europe. Lastly, my main project involved crafting a report on the Hub’s communication strategies and suggesting how to improve European outreach. I analyzed data on the Hub’s global following and outreach. I presented my findings and advised ways to improve CRM and SEO. My report was adopted and submitted to the main office of EIT in Budapest to guide the Hub on a new media strategy.

This experience was funded by: Student Internships Endowed Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 104

Karina Suwal ’23

Major(s): Biology

Title: L’hôpital du jour à l’hôpital de Pitié-Salpêtrière

This summer I worked with the child and adolescent psychiatric unit at Pitié-Salpêtrière hospital in the 13th arrondissement in Paris, France. There I observed Dr. Catherine Saint-Georges and the healthcare team in the l’hôpital du jour (HDJ), where I worked with the children receiving care from the team, as well as shadowed the clinical consultations held by the unit.

This experience was funded by: Abeona Endowed Fund for International Internships.

Presentation time: 5:45 - 6:30 p.m.
Poster number: 105

Dane Swanser ’23

Major(s): History

Title: Studying the French Education System with Les Petits Debrouillards

My work with Les Petits Debrouillards, a French education and civic engagement organization, allowed me to gain a better understanding of French social and science issues while also being involved directly in the French educational system. I was able to hone my French language skills, teach curriculum in a number of community spaces, and help with social media and communications. During my two months at this internship, I learned a variety of valuable professional lessons, and was able to challenge my own skills by placing them in a country in which they had far less obvious use. This resulted in a proficiency with French and increased confidence in my ability to navigate and deal with challenging circumstances.

This experience was funded by: Abeona Endowed Fund for International Internships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 96
Neda Tehrani ’23

Major(s): Studio Art, Biology
Other Authors/Contributors:
Supervisor(s) and affiliation or institution: Diego Perez-Tilve (Research Associate Professor, Department of Pharmacology & Systems Physiology, University of Cincinnati College of Medicine)

Title: Investigating the Signaling Pathway of AgRP Appetite Regulation

Diabetes affects 1 in 10 Americans, and along with other obesity-related metabolic diseases, it represents a leading cause of preventable, premature death. Developing therapies to treat diabetes is urgent and necessary. The agouti-related peptide (AgRP)-producing neurons are known to control appetite and energy homeostasis along the same metabolic pathways that become dysregulated in disease states. G protein-coupled receptors (GPCRs) facilitate the transmission of hormones to cellular membranes by coupling with G proteins, multimeric second messengers that regulate the activity of AgRP neurons. We hypothesize that inhibitory G alpha subunit (Gαi/o) signaling plays a role in AgRP neurons’ regulatory effects. Inducing expression of pertussis toxin (Ptx) in murine AgRP neurons using an adeno-associated virus reduces Gαi/o signaling. Our preliminary finding is that limiting Gαi/o activity in mice led to increased food intake, demonstrating Gαi/o’s contribution to AgRP neuronal function and offering a potential therapeutic target.

Presentation time: 4:30 - 5:15 p.m.
Poster number: 97

Allison Teichman ’23

Major(s): Chemistry

Title: Neighborhood Outreach to Support Healthy Communities

This summer I worked as an intern with Growing Up Healthy, a non-profit organization supported by the Healthy Community Initiative. We focused on promoting social connectedness and increasing accessibility to community resources among primarily Latine, immigrant, and low-income neighborhoods in Northfield and Faribault through Evenings in the Park and other grant-funded programming. We worked with community partners including the Community Action Center and Rice County Public Health to offer resources aiding in healthy child development.

This experience was funded by: Trace McCreary ’89 and Alissa Reiner Endowed Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 98

Nectaree Thao ’23

Major(s): Sociology/Anthropology

Title: E-Commerce and Digital Marketing In Dublin, Ireland

I was part of the Global Edge program which allowed me to gain professional experience in the field of my interest in Dublin, Ireland this summer. I worked with a small agency called Click Media which mainly worked in the automobile industry.
Drew Thompson ’23

Major(s): Physics
Supervisor(s) and affiliation or institution: Yoichi Watanabe (University of Minnesota Medical School)

Title: Predicting Radiation Therapy Outcomes with Radiomics

This summer, I conducted medical physics research at the University of Minnesota Department of Radiation Oncology under the supervision of Dr. Yoichi Watanabe. The project consisted of compiling tumor and outcome information for patients having undergone Lung Stereotactic Body Radiation Therapy to build predictive machine learning models. These can be further developed to provide improved disease diagnosis and direction for cancer treatment innovation.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Rainey Tilley ’23

Major(s): Chemistry

Title: The Effect of Physician-Patient Communication About Uncertainty on Patient Satisfaction: a Review

Uncertainty is inherent in medical practice. Although there has been increased attention to patient-centered care and shared decision-making between the patient and the health care team, there is limited understanding of how physician-patient communication of uncertainty affects the patient. My systematic review of the literature aimed to synthesize what is known about how physician-patient communication of scientific uncertainty affects patient satisfaction. Preliminary conclusions of the four studies that fit the inclusion criteria indicate that physician communication of uncertainty does impact patient satisfaction. However, more primary research needs to be conducted.

This experience was funded by: The Kolenkow-Reitz Fund

Peter Tu ’24

Major(s): Cinema and Media Studies, Computer Science

Title: Using Voice Technology for Game Development

This summer, I worked as a game developer in Saykid. It features a plush toy called the Toybot with an Amazon Alexa device inside aiming to help kids learn in the early stage. My main job is to design voice games for ToyBot that are both engaging and accessible to kids.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship
**Semma Twining ’25**

**Major(s):** Undecided  
**Title:** *Six Weeks as A Teacher in Kenya*  
This summer I spent six weeks teaching in Kenya as an instructor with KenSAP, a college access program. I co-taught SAT math and designed a college-level writing course, which I solo-taught. Before teaching, I helped select the group of twenty students by conducting interviews and holistically reviewing their applications.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

**Presentation time:** 4:30 - 5:15 p.m.  
**Poster number:** 101

**Vasilii Vaganov ’24**

**Major(s):** Biology, Chemistry  
**Supervisor(s) and affiliation or institution:** Rou-Jia Sung (Assistant Professor of Biology, Carleton College)  
**Title:** *Development of Expression and Purification Protocols for Characterizing Members of the Ly6 Protein*  
The Ly6 proteins are a family of novel regulatory proteins conserved among multiple species that share significant structural homology with alpha neurotoxins commonly found in snake venoms, such as bungarotoxin. Previous work studying Ly6 function has relied on in vivo monitoring of endogenous protein levels/behaviors; however, the ability to biochemically characterize and study Ly6 function using purified protein has been limited. Ly6 proteins share a conserved motif known as the LU (Ly-6/uPAR) domain, in which 10 cysteines form five disulfide bonds that maintain the highly flexible three-fingered structure of the LU domain. These predicted structural elements make the expression of Ly6 proteins in their soluble form challenging. In this study optimal recombinant expression and purification conditions for the ODR-2, a membrane-associated protein related to the Ly6 superfamily of GPI-linked signaling proteins found in C. elegans, were elucidated. Use of N-terminal GST, MBP, and pelB leader sequence tags did not improve soluble expression; an N-terminal SUMO-tag did promote soluble expression in the supernatant. All constructs showed significant insoluble expression in the pellet. Surprisingly, we found that optimal expression yield occurred at 30 or 35°C and a 3-hour induction time. We are in the process of scaling up expression and developing protocols for purification of both soluble and insoluble ODR-2.

This experience was funded by: The Towsley Endowment for the Sciences

**Presentation time:** 4:30 - 5:15 p.m.  
**Poster number:** 102

**Marycruz Valdivia Acosta ’24**

**Major(s):** Sociology/Anthropology  
**Title:** *Latine Fatherhood, Machismo, and Autistic Child Upbringing*
My research uses a sociological lens to study autistic children in Latine families. Previous research in this area tends to focus on cultural disparities between white practitioners and Latine families that have autistic children. However, there has been a lack of research examining Latine fatherhood and machismo, specifically as it relates to how Latine fathers choose to raise autistic children. Through my qualitative research, I will explore how Latine fathers interact with their autistic children, and what role machismo plays in this dynamic.

This experience was funded by: Mellon Mays Undergraduate Fellowship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 103

Selma Vangstein ’25

Major(s): Undecided
Supervisor(s) and affiliation or institution: Ryan Terrien (Assistant Professor of Physics and Astronomy, Carleton College)

Title: Line-by-Line Measurements of the Epsilon Eridani spectrum

Changes in the lines in stellar spectra are paid strong attention to because they can indicate the existence of an exoplanet. However, it is currently hard to differentiate between changes caused by features of the stellar surface and doppler shift changes caused by exoplanets. We use spectra from the star Epsilon Eridani from the NEID spectrometer to explore the relationship between the stellar magnetic field and changes in individual spectral lines. We gather a list of about 1700 lines and make 28 measurements over a period of five months to study the development. We are able to identify a set of lines with a stronger correlation with the magnetic field. Through this research, we also developed a program to normalize spectra from the NEID spectrometer, along with streamlining the process for identifying and cleaning up lists of wanted lines.

This experience was funded by: The Towsley Endowment for the Sciences

Presentation time: 5:45 - 6:30 p.m.
Poster number: 108

Aniketh Vipparla ’24

Major(s): Biology
Other Authors/Contributors:
Supervisor(s) and affiliation or institution: Stephan Zweifel (Professor of Biology, Carleton College)

Title: Mitochondrial DNA Sequencing and Phylogeny Among two Host Races of the Goldenrod Gall Fly Eurosta solidaginis

Flies in the Tephritidae family commonly induce gall formation in multiple host-plant species. The utilization of different host-plant species may prevent the interaction among flies, thus restricting gene flow and host-races to emerge (Smith et al. 2003). This emergence of unique host-races can occur in the same geographic area, with the possibility of eventually splitting into distinct species (sympatric speciation). Previous studies have shown genetic differences exist between two host-races of the gall fly Eurosta solidaginis that form galls on the goldenrod plants, Solidago gigantea and Solidago altissima (Brown et al. 1996). These preliminary studies were based on examining a small subset of genes in the mitochondrial DNA. Our goal is to determine the total amount of genetic variation present between the
two host-races by sequencing the entire mitogenomes of these two host-races (about 16,000 base pairs each). This DNA sequencing information will also be used to accurately place the E. solidaginis flies in the phylogenetic tree of the Tephritidae family.

This experience was funded by: The Rosenow Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 109

Hongshen Wang ’23

Major(s): Biology

Title: **NKG2A blockade does not increase NK cell killing activity against ovarian cancer cell lines**

Natural killer (NK) cell is a type of immune cells that can kill cancer cells. Its activation is regulated by a balance between activation and inhibition signals received through surface receptors. One example is NKG2A, an ITIM-bearing inhibition receptor expressed by NK cells. Many tumor cells upregulate expression of surface proteins that can bind to inhibition receptors on NK cells to evade anti-tumor immunity. One of these proteins is (HLA)-E, a non-classical class I major histocompatibility complex (MHC-I) molecule that can bind to NKG2A. The goal of my project is to assess the role of the NKG2A-(HLA)-E inhibition axis in mediating NK cell killing activity against ovarian cancer cell lines. NK cells were treated with antibody that can block NKG2A and incubated with ovarian cancer cell lines OVCAR-3 or SKOV-3. The percentage of cell lysis was measured to determine NK cells killing.

This experience was funded by: Eugster Endowed Student Research and Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 104

Kevin Wang ’24

Major(s): Philosophy

Title: **Profiling Clonal Hematopoiesis of 982 Individuals in Mayo Clinic Biobank**

I worked under Dr. Shulan Tian in the Department of Computational Biology on a project called UNISON, a computational pipeline developed to better detect a health condition called clonal hematopoiesis (CH) of indeterminate potential (CHIP). CHIP is a premalignant state in which leukemia-associated driver genes acquire somatic mutations in peripheral blood, and serves as a risk factor for hematologic cancers, cardiovascular diseases, and all-cause mortality; it affects more than 10% of people aged 60 and older. My main contribution to the project was analyzing how well UNISON performed given a real-life sample, and comparing it to technologies used in prior studies. After profiling the CHIP landscape in the Mayo Clinic biobank cohort, we detected 202 CHIP driver mutations, 65.8% of which were discovered by previous cohort studies. The analysis on the characteristics of CHIP revealed the top mutated genes as well as phenotypic association with age and smoking status.

This experience was funded by: Sam ’75 and Meg Woodside Fund for Career Exploration

Presentation time: 4:30 - 5:15 p.m.
Poster number: 105
Weiland Wang ’23

Major(s): Chemistry
Other Authors/Contributors: Rong Huang (Associate Professor of Medicinal Chemistry and Molecular Pharmacology, Purdue University)

Title: NatD Oncogenic Mutants Effects on Acetylation Kinetics & Localization

Protein N-terminal acetyltransferases (Nats) are responsible for posttranslational modifications in epigenetic pathways. Abnormal regulation of these proteins has a direct link to the development of cancers. Consequently, it is critical to study the mechanisms behind these regulatory elements. Particularly, we are interested in the acetylation activity & localization of NatD (targets histones H4 & H2A) within cells. Therefore, three NatD oncogenic mutants (E89K, R105Q, R148Q) were generated to assess acetylation activity, and transfection of NatD long & short (wild type & truncated) allowed for a visual of the localization of NatD within colon cancer cells (HCT-116).

Presentation time: 4:30 - 5:15 p.m.
Poster number: 106

Emma Watson ’23

Major(s): Chemistry, Geology
Other Authors/Contributors: Ellie Vandel ’23
Supervisor(s) and affiliation or institution: Daniela Kohen (Professor of Chemistry, Carleton College), Matt Whited (Associate Professor of Chemistry, Carleton College)

Title: Computational Investigation of Chemical Reactivity at Cobalt-Silicon Bonds

A novel organometallic catalyst developed by our experimental lab utilizes a polarized Si-Co bond to facilitate the transformation of an azide into an organic isocyanate. Our computational lab uses DFT/Gaussian 16 to examine the energetic space of this catalytic cycle. This summer, we implemented an algorithm (CREST) to explore the conformational space of this reaction, thus refining our understanding of the proposed mechanism. We used these conformers to search for transition states to investigate limits on catalysis. These transition states also tell us about the energies of specific mechanistic pathways, allowing us to determine the most likely mechanism.

This experience was funded by: NSF Grant

Presentation time: 5:45 - 6:30 p.m.
Poster number: 110

Grace Werner ’24

Major(s): Cognitive Science

Title: Interning at the Immigrant Law Center of Minnesota

At the Immigrant Law Center of Minnesota (ILCM), I worked with clients and volunteer attorneys regarding a range of legal requests and issues in immigration, such as DACA, naturalization, and asylum. In addition, I learned more about the study of immigration law and the immigrant and refugee communities contributing to Minnesota.
Ellie Weston ’24

Major(s): Physics
Supervisor(s) and affiliation or institution: Marty Baylor (Professor of Physics, Carleton College)

Title: Measuring Surface Tensions of Liquid Lens Interfaces

We create polymer lenses, which are less fragile, less dense, and cheaper than glass lenses. To form lenses, we drop hydrophobic liquid polymer onto an aqueous substrate. We use pendant drop and Wilhelmy plate methods to measure the surface tension of the liquid lens interfaces. We seek to use these measurements to better develop a computational model that predicts the lens shape.

This experience was funded by: The Towsley Endowment for the Sciences

Aiana Whitfield ’23

Major(s): Cognitive Science

Title: Personal and Professional Development Summer 2022

This summer I was blessed with the honor of working as an Executive Assistant for the successful and accomplished PJ Hill. Given that PJ is active in several communities, my role was extended in three distinct industries of work. I was able to shadow him and other financial advisors at Northrock Partners, I engaged in non-profit work with the Minneapolis charter of the NAACP, and finally I gained experience in the real estate industry as I learned from PJ while he closed deals and negotiated with the government for assistance with property inquisition and management.

This experience was funded by:

Ella Wiegman ’25

Major(s): Undecided
Supervisor(s) and affiliation or institution: Dan Hernández (Professor of Biology, Carleton College), Mark McKone (Towsley Professor of Biology, Carleton College), Sydney Marie Jones (Educational Associate in Biology, Carleton College)

Title: Dominant Grass Exclusion in Restored Prairie has Lasting Impacts on Ecosystem Properties

In restored prairies, the two dominant grass species Andropogon gerardii and Sorghastrum nutans often exist at a disproportionately high abundance relative to native prairies. To understand the impacts of
dominant grasses on abiotic conditions and ecosystem processes, we planted a restored prairie with plots either including or excluding the two predicted dominant species in a high diversity seed mix. We measured the treatment effects on soil moisture, light availability, and soil respiration rates. In 2022, 10 years after planting, communities that included the dominant species in the seed mix had higher soil moisture and reduced light availability at the soil surface. Soil respiration rates were also higher in plots initially planted with dominant grasses. Despite encroachment by dominant species in plots where they were originally excluded, ecosystem properties remain distinct between treatments. Thus, the exclusion of dominant species from seed mixes in prairie restorations may have lasting impacts on ecosystems.

This experience was funded by: The Rosenow Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 113

Augustus Williams ’24

Major(s): Mathematics

Title: Compartmental Modeling of SARS-CoV-2 in Brazil

Since the beginning of 2020, there have been 570 million cases of COVID-19 worldwide and over 6.38 million deaths. For countries that struggled to mitigate the pandemic’s spread early on, its impacts have been devastating. Brazilian leadership has been accused of severely mishandling COVID-19, having the third highest amount of cases and the second highest amount of deaths of any country. Using public data from the Johns Hopkins Coronavirus Resource Center, we explored the spread of SARS-CoV-2 in Brazil to better understand one of the worst outbreaks of COVID-19 in the world and test the viability of compartmental models for public policy intervention. Our findings suggested to us that these models were not only accurate in their predictions, but also aided in comprehension of the reasoning behind Brazil’s struggle to handle COVID-19.

This experience was funded by: Summer Science Fellowship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 114

John Win ’25

Major(s): Undecided

Title: Raising Awareness on Myanmar Politics with Mutual Aid Myanmar

Mutual Aid Myanmar was established after the 2021 coup in Myanmar to help support public servants on strike (also known as Civil Disobedience Movement members) from clerks to soldiers. My task at Mutual Aid Myanmar was to raise the global audience’s awareness on what’s happening in Myanmar using their social media platform and find ways to fundraise for the organization.

This experience was funded by: Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship

Presentation time: 4:30 - 5:15 p.m.
Poster number: 108
Lauren Witmer ‘23

Major(s): Linguistics
Other Authors/Contributors: Jack Rizzo ‘24
Supervisor(s) and affiliation or institution: Catherine Fortin (Associate Professor of Linguistics, Carleton College)

Title: It’s, uhm, a foray into Corpus Linguistics

We conducted research this summer with linguistics Prof. Cati Fortin investigating the status of filled pauses uh & uhm. We learned corpus methodology from the workshop taught by the University College London and applied it to the International Corpus of English - Great Britain Edition (ICE-GB). Researchers have been debating this topic for a couple decades, beginning with Clark and Fox Tree (2002), who used British English corpora to claim that uhm and uh are words. We seek to contribute to this debate by analyzing data from ICE-GB to determine if uh and uhm are actually words, if they signal linguistic function but are not otherwise word-like, or if they are merely symptoms of production difficulties. Our preliminary findings support current research on French data (Kosmala and Crible (2022)), which asserts that a more nuanced view is needed.

This experience was funded by: Dean of College Student Research Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 115

Ella Woodruff ‘23

Major(s): Biology

Title: Conservation and Public Education at the Atlantic White Shark Conservancy

This summer, I worked with the Atlantic White Shark Conservancy at the Shark Center in Chatham, MA, helping with public education. This organization works to support the research of white sharks in the Atlantic, educate the public about white sharks, and help with public safety initiatives surrounding sharks. The Shark Center specifically focuses on public education, providing a space to learn about the natural history and general science of white sharks on Cape Cod. Working at the Shark Center, I communicated the goals and ideas of the conservancy, engaged with the public about sharks on Cape Cod, translated scientific research for different public audiences, and generally tried to inspire interest in conservation of marine ecosystems.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 116

Jingwen Wu ’24

Major(s): Geology
Supervisor(s) and affiliation or institution: Daniel P. Maxbauer (Assistant Professor of Geology, Carleton College)

Title: Mineralization of Carbon Dioxide using Slag Fertilizers
Carbon dioxide removal will be needed to limit the impacts of climate change and to help meet international emissions goals. The agricultural application of crushed minerals and materials that are reactive with carbon dioxide is one plausible pathway to developing scalable solutions for carbon removal. This study evaluates the utilization of direct, continuous measurements of CO₂ gas flux as a measure of carbon dioxide mineralization of slag fertilizers that are utilized in agriculture. The experiment was conducted on campus in the Annex Student Farm area near the Carleton College athletic fields. The application of slag fertilizers initially causes a measurable uptake of CO₂ and subsequently reduces soil CO₂ flux due to the rapid reaction of Ca and Mg hydroxide minerals present in the slag. Preliminary results suggest that slag fertilizers mineralize ~7.5% of their weight in CO₂ after the first ~2 weeks of application. Future work will continue to evaluate early uptake and monitor the impacts of slag fertilizers over longer time periods.

This experience was funded by: NSF S-STEM grant

Presentation time: 5:45 - 6:30 p.m.
Poster number: 117

**Josh Wu ’24**

Major(s): Biology
Supervisor(s) and affiliation or institution: Matt Miller (Professor of Biochemistry, University of Utah)

**Title: Effect of Ndc80 and Spc24 mutations on Stu2 dynamics and occupancy & Tagging Kinetochore Genes**

The basis of life depends on an organism’s ability to reproduce, a bequeathment ritual of its most sacred possession: DNA. In eukaryotes, this involves the faithful segregation of duplicated chromosomes to offspring via kinetochore-microtubule attachments. Due to its highly conserved nature, the unbelievably versatile and fertile model organism yeast can be used to study the mechanisms used for chromosome segregation. Previously, we have identified a kinetochore-associated protein, Stu2, that contributes tension-dependent stabilization that is necessary and sufficient for proper segregation (Miller, Matt). Furthermore, we show that the binding site is at a C-terminal segment of Stu2 that binds to other kinetochore components, Ndc80 and Spc24 (Stewart, Michael). But Stu2 is multi-faceted, and the complete process underlying its dynamic function and occupancy with the kinetochore is still unknown. By creating mutations to hypothesized Stu2 binding sites on Ndc80 and Spc24, we hope to elucidate the function or occupancy of Stu2 further. But Stu2 is not the only kinetochore protein we care about; thus, we are tagging other kinetochore genes to potentially explore different areas of this complex protein.

This experience was funded by: Class of 1964 Endowed Internship Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 118

**Matt Wyffels ’23**

Major(s): Economics

**Title: Summer Intern at Digital River**

I spent the summer of 2022 working as a finance intern for Digital River in Minnetonka, MN. I developed essential financial skills and took part in multiple financial modeling processes. I made meaningful connections with fellow coworkers and interns and used this opportunity to figure out a future career for myself.
This experience was funded by: Student Internships Endowed Fund

Presentation time: 4:30 - 5:15 p.m.
Posterno: 109

Andy Yang ’24

Major(s): Political Science/International Relations
Supervisor(s) and affiliation or institution: Christina Farhart (Assistant Professor of Political Science, Carleton College)

Title: Through Partisan Colored Glasses: Democratic Backsliding and Perceived Electoral Legitimacy in the 2020 U.S. Election

The research examined how and why election legitimacy was perceived distinctively in the US 2020 presidential election. An investigation into democratic backsliding explained the increasing polarization between partisans and the rise of an authoritarian-populist leader, which illuminated the factors behind perceptions of election fraud and legitimacy. Briefly, the losers of the election were most likely to perceive election fraud. This mentality was further deviated by voters’ partisanship. The exacerbating party polarization exposed partisans to biased information sources and rendered them vulnerable to disinformation and conspiracy theories, leading to expanding distrust in the election result.

This experience was funded by: The Carleton Humanities Center

Presentation time: 4:30 - 5:15 p.m.
Posterno: 110

Zhihan Yang ’23

Major(s): Mathematics, Statistics
Supervisor(s) and affiliation or institution: Adam Loy (Assistant Professor of Statistics, Carleton College)

Title: A Review of MCMC Software for an Undergraduate Bayesian Statistics Course

Computation is a fundamental element of Bayesian statistics, allowing us to fit complex models where we can’t find closed-form solutions for the posterior distribution. While there is broad agreement about how fundamental computation is to the Bayesian paradigm in undergraduate statistics education, it’s unclear what framework should be used in the classroom. We reviewed different ways MCMC can be implemented in R, comparing and contrasting the flexibility, extensibility, and required cognitive load. Specifically, we compared how common Bayesian models can be fit using the following MCMC programs: Just Another Gibbs Sampler (JAGS) (via runjags and rjags), Stan (via rstan, rstanarm and brms), greta, and NIMBLE. We found that 4/5 low-level packages (rjags, runjags, rstan and NIMBLE) surveyed were satisfactory; they differ mainly in their execution speed and whether they have high-level interfaces. Compared to high-level interfaces, low-level packages also allow for more straightforward translation between models and code.

This experience was funded by: Elaine Tatham ’58 Endowed Fund for Mathematics and Statistics

Presentation time: 5:45 - 6:30 p.m.
Posterno: 119
Jisoo Yeom ‘24

Major(s): Biology
Supervisor(s) and affiliation or institution: Jennifer Ross-Wolff (Professor of Biology, Carleton College)

Title: **MAB-5 in Neuronal Development of Male C. Elegans**

In the model organism Caenorhabditis elegans, a small nematode, there are two sexes -- the hermaphrodite, and the male. The ventral cord neurons (VCNs) are analogous to a spinal cord in vertebrates, The majority of VCNs are present in both sexes, but there are some neurons that are sexually distinct. The hermaphrodite has 6 ventral cord (VC) neurons, while the male has 9 pairs of neurons called CA and CP, resulting in 18 total sexually distinct neurons. LIN-39 and MAB-5 are Hox proteins that control the anterior-posterior development of the CAs and CPs along the ventral cord. This study aimed to use CRISPR-Cas9 technology to endogenously tag MAB-5 to create a strain of worms that can be observed during the development of these sex-specific CAs and CPs.

This experience was funded by: The Rosenow Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 111

Eric Yuan ‘25

Major(s): Undecided

Title: **Helping Constituents Through the Federal Government**

This summer, I interned in the Everett district office of U.S. Representative Rick Larsen (D-WA-02). My duties centered around constituent service, primarily mail and phones. I also worked on an infrastructure project tracking sheet and had the opportunity to join Representative Larsen on visits across the second district.

This experience was funded by: Jean Phillips Memorial Internship Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 112

Zitian Yue ‘23

Major(s): Physics
Supervisor(s) and affiliation or institution: Ryan Terrien (Assistant Professor of Physics and Astronomy, Carleton College)

Title: **Examining the Chromatic Drifts of the Etalon Calibration System used in HPF and NEID Projects**

White light-illuminated Fabry-Perot etalons are employed in exoplanet finding projects like HPF and NEID to serve the function of wavelength calibrations. It was found that the etalon system experiences chromatic drifts and may not provide a stable reference for high-precision measurements as previously assumed. Using ~7000 HPF spectra and 406 NEID spectra, we examined the behavior of drifts within the etalon calibration system. We also tested a model for the uncertainty in these measurements. Consistent with previous results, we find an oscillatory variation of drift with wavelength. The increase
in magnitudes of those rates implies that the influence of chromatic drifts is getting more severe with time. Finally, we confirmed the accuracy of the uncertainty model for our measurements.

This experience was funded by: National Science Foundation - ATI

Presentation time: 5:45 - 6:30 p.m.
Poster number: 120

**Karina Yum ’23**

Major(s): Religion

**Title: Evangelical Testimonies and LGBTQ+ Coming-Out Narratives**

My research compares the genres of evangelical testimonies and queer coming-out stories. While the identities of evangelical and queer may seem contradictory—if not incompatible—performances of both identities involve, or in some cases require, performative participation in a pre-existing narrative genre as a way to authenticate one’s identity, and thus confirm one’s group membership. Narrative is an important vehicle for constructing identity because its claims seem inevitable, natural, and invite the listener into an imagined past. Through constructing a genealogy of evangelical testimonies from Paul in the New Testament to testimonies published by the magazine Christianity Today, my work analyzes how the genre of conversion has evolved, and the ways in which coming-out stories emerge from, and subvert, the genre. Ultimately, I assert that the genre of coming-out narratives should be understood as an application and extension of the pre-existing plot structure of evangelical conversion narratives.

This experience was funded by: Mellon Mays Undergraduate Fellowship

Presentation time: 5:45 - 6:30 p.m.
Poster number: 121

**Jane Zeman ’23**

Major(s): Environmental Studies

**Title: Sustainability Internship in Northfield, Minnesota**

Worked with the Greater Northfield Sustainability Collaborative and CCCE to address waste management issues in the city of Northfield.

This experience was funded by: The Carleton ENTS Program

Presentation time: 4:30 - 5:15 p.m.
Poster number: 113

**Mariam Zewdu ’24**

Major(s): History, Political Science/International Relations

**Title: Ireland: Learning & Growth in Legal Aid**

Throughout the summer I did various tasks at a legal aid firm in Ireland including: observing Court proceedings; attending and participating in client meetings; preparing documents and competing other
various clerical duties; and most importantly shadowing and supporting colleagues for their various cases in all areas of law. This experience allowed me to work with such diverse clientele of all backgrounds, immigration statuses, English proficiency levels, etc. Overall this experience allowed me to continue doing work I was passionate about, helping marginalized communities provide them a voice in legal processes.

This experience was funded by: Global Edge Program, Robert E. Will ’50 Endowed Internship Fund in Social Entrepreneurship, and Abeona Endowed Fund for International Internships

Presentation time: 5:45 - 6:30 p.m.
Poster number: 122

**Evelene Zhang ’25**

Major(s): Undecided
Other Authors/Contributors: Nzingha Joseph ’25
Supervisor(s) and affiliation or institution: Rob Thompson (Associate Professor of Mathematics, Carleton College)

**Title: Mathematical Approaches to the Archaeological Refit Problem**

Archeologists often look for evidence in the remnants of the past, like old bones, to better our understanding of human activity. This evidence is growing increasingly quantitative, incorporating more sophisticated tools from applied mathematics, statistics, and computer science to unearth the stories that broken bones can tell: stories of early human and animal activity and interaction.

Working with a consortium of researchers known as AMAAZE (https://amaaze.umn.edu), we aim to create digital reassemblies of broken bones. Using 3D scans of these bones, we isolate the break faces, compare the shapes of these faces, and realign them to form a more complete reconstruction of the original bone. This process blends ideas from linear algebra, computational geometry, and optimization.

This experience was funded by: The Towsley Endowment for the Sciences and the Carleton Summer Science Fellowships

Presentation time: 4:30 - 5:15 p.m.
Poster number: 114

**JoJo Zhang ’23**

Major(s): French and Francophone Studies, Political Science/International Relations

**Title: Combatting Racism with SOS Racisme**

This summer I was an intern at SOS Racisme, a French anti-racism non-profit organization. My daily tasks ranged from giving legal advice to victims of racism, to taking notes, to doing research on various topics of jurisprudence, to miscellaneous tasks to help out other offices. All the work and research were conducted in purely in French, unless the victims preferred English (extremely rare). I also had the opportunity to help set up an event and debate hosted by SOS Racisme for the 60th anniversary of Algeria’s Independence.
Xingyi Zhang ’24

Major(s): Mathematics, Psychology
Supervisor(s) and affiliation or institution: Eric Alexander (Assistant Professor of Computer Science, Carleton College)

Title: Semantic Priming in Word Clouds

There have been contradictory results on whether semantic meaning of words in parafoveal vision (e.g., outside our central vision) can influence viewers, without them actively looking at (“saccading” to) each individual word. This experiment aims to investigate this question, specifically asking: (1) whether words in non-central vision can “prime” semantically related words and concepts; and (2) whether multiple related words have a stronger priming effect than single words.

Songyan Zhao ’23

Major(s): Computer Science
Other Authors/Contributors: Berker Banar (PhD Researcher at C4DM), Nick Bryan-Kinns (Professor, Queen Mary University of London)

Title: VAE based explainable AI for music generation

Explainable AI has the potential to support more interactive and fluid co-creative AI systems which can creatively collaborate with people. To do this, creative AI models need to be amenable to debugging by offering eXplainable AI (XAI) features which are inspectable, understandable, and modifiable. During this summer, we tested an existed AI model based on VAE for music generation (Brain-Kinns et al.) to have a better understanding of the the trade-off between number of latent dimensions, number of regularized musical attributes, reconstruction quality, and interpretability score of the model. Also, by implement different datasets that have different musical styles, we proved that this model and the approach the model uses can be applied to jazz, popular, and classical music.

This experience was funded by: General Student Internships Fund

Presentation time: 4:30 - 5:15 p.m.
Poster number: 116
Jimmy Zhong ’23

Major(s): Biology, Computer Science

Title: Gut Microbiomes of the American Indian Children with Obesity Show Transition from Non-industrialized to Industrialized Lifestyle

Childhood obesity has become a global epidemic, and prevalence of severe obesity is higher among minority populations including the American Indians/Alaska Native (AI/AN) children. Gut microbiomes interact with host immunity and modulate the energy balance of the host. The gut microbiome of an individual is affected by his/her lifestyle and ancestral history. Here, we observe that the taxonomic and pathway compositions of AI/AN gut microbiomes show similarities to both the industrialized and non-industrialized populations. Between industrialized and non-industrialized microbiomes, a trade-off between the genus Prevotella and Bacteroides had been previously reported. We observed high abundance of Prevotella and low abundance of Bacteroides in non-industrialized microbiomes, but the opposite in industrialized microbiomes. However, in AI/AN microbiomes, the abundance of both Prevotella and Bacteroides were low, leading to a drop in the overall abundance of the Bacteroidetes phylum. AI/AN microbiomes also had increased abundance of the pathways related to fermentation from/to pyruvate and nucleotide metabolisms. The former directly affects energy harvest and thus obesity; for the latter, microbial-origin nucleotides have been shown to have anti-inflammatory effects, and chronic gut inflammation is linked to diabetes and obesity. Thus, we suspect that changes in pathway composition are implicated in the development of obesity among AI/AN children.

This experience was funded by: The Kolenkow-Reitz Fund

Presentation time: 5:45 - 6:30 p.m.
Poster number: 124

Aaron Zivsak ’25

Major(s): Undecided

Title: Legal Affairs Internship in London

This summer I had the opportunity to intern at the Afghanistan and Central Asian Association (ACAA) in London, England. The organization is a non-profit that aims to empower and support vulnerable refugees, migrants, and displaced people in the UK. As a legal intern, I primarily worked in their walk-in legal advice clinic helping with asylum and housing applications, coordinating claims and reports with the Home Office, and working to obtain government benefits and visas for people in need. As the organization was fairly small, I was also able to work in different positions in the NGO including in strategic development, political communications, and alongside the director. Through this diverse set of experiences, I gained direct insight into how a small NGO is run and operated.

This experience was funded by: Initiative for Service Internships in International Development

Presentation time: 5:45 - 6:30 p.m.
Poster number: 125