

October 17, 2025

Welcome to the 2025 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 grapple with the myriad ways 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 ask 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

Poster #1

Title: *Project Pericles: Evaluating Civic Engagement*

Presenter(s): Nafees Abdullah '28

This summer, I interned at Project Pericles, a nonprofit organization focused on integrating civic engagement into higher education. As an Evaluations and Impact intern, I was tasked with developing evaluation strategies for its grant programs and applying them to create an impact report on Project Pericles' programs this academic year. I also led the development of its AI policy and took on a variety of ad-hoc tasks, like updating content modules.

This experience was funded by Carl and Ruth Weiner Fund for Social Justice Internships

Poster #2

Title: *Internship in the Thielen Lab at the University of Minnesota - Twin Cities Department of Pediatrics*

Presenter(s): Genevieve Agati '28

As a student intern in the Thielen Lab at the University of Minnesota, my research goal was to develop a comprehensive profile of the healthy human upper respiratory microbiome using culturing and direct sequencing. My daily responsibilities included swabbing participants' nasal cavities, preparing media to grow microbial colonies, reviewing related studies, and conducting genome extraction and sequencing. I also had the opportunity to shadow Dr. Thielen and the rest of the infectious diseases team at Masonic Children's Hospital for several days in June and July, which was an incredibly rewarding and informative experience. I spent my free time exploring the Twin Cities: I visited art museums, shared meals with nearby Carleton friends, explored Minnehaha Falls, and biked for hours along the Mississippi. In all, this experience has absolutely improved my abilities navigating new experiences with an open mind and making the most of every opportunity.

This experience was funded by Class of 1970 Endowed Internship Fund

Poster #3

Title: *You're Not Alone: Barriers to Studying Diverse Participants in Relationship Science*

Presenter(s): Vivian Agugo '26, Katelyn Harder '26

Other Authors/Contributors: Ben Schneider '25, Keon Staples '25, Laura Boyd '25, Emma McGorray (Assistant Professor of Psychology, Carleton College)

Supervisors and Institutional Affiliations: Emma McGorray (Assistant Professor of Psychology, Carleton College)

Past research into the diversity of relationship samples has demonstrated that samples are generally not diverse (McGorray et al., 2024; Williamson et al., 2023). We surveyed relationship researchers to identify the barriers that make it challenging for them to use more diverse and inclusive methods and samples. 186 relationship scientists completed a questionnaire about obstacles they face in recruiting, analyzing, and publishing relationship studies with diverse samples. Our analysis of survey responses revealed that financial limitations and uncertainty about how to conduct analyses with small subgroups were common barriers, with 40% of respondents indicating they faced those issues. Other barriers included uncertainty about best practices in demographic measurement and time constraints. Through this work, we were able to identify the barriers that researchers face so that we can develop resources to help researchers overcome them. Going forward, it is important that researchers and institutions continue seeking ways to reduce barriers to diverse sampling, ensuring that we can advance our understanding of all kinds of relationships.

This experience was funded by

Poster #4

Title: *Wildlife Medicine and Rehabilitation in Maryland*

Presenter(s): Jocelyn Akst '27

Second Chance Wildlife Center (SCWC) is a non-profit organization located in Gaithersburg, MD, that provides "skilled and compassionate emergency treatment and long-term rehabilitative care to injured, ill, and orphaned wildlife with the goal of releasing healthy animals back to their intended roles in nature" (Second Chance Wildlife Center).

As a summer intern, I worked with SCWC's medical staff to care for wildlife such as songbirds, ducks, geese, squirrels, turtles, snakes, and more. My role as an intern focused primarily on the day-to-day care of the animals being rehabilitated by SCWC.

This experience was funded by Project '60 Endowed Internship Fund

Poster #5

Title: *Summer internship at the World Bank*

Presenter(s): Omar Alsaad '26

This poster presents insights from my summer internship with the World Bank's Middle East and North Africa Human Development team in Washington, D.C. My work focused on analyzing demographic

transitions and their implications on health, education, and social protection systems in the MENA region. Through research, data visualization, and policy synthesis, I contributed to the preparation of the MENA Human Development flagship report. I identified key “megatrends” influencing regional outcomes and developed recommendations for smoother demographic and institutional transitions. The experience enhanced my research and analytical skills while exposing me to the challenges of translating data-driven insights into actionable policy. This internship reinforced my interest in development economics and the role of evidence-based policymaking in addressing social and economic disparities across diverse contexts.

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

Poster #6

Title: *What it Means to be Self-Sustaining: Exploring Farm-to-Table Practices & Land Stewardship in Alaska*

Presenter(s): Alyssa Alvarez '26

This summer, I explored human impacts on Alaska’s landscapes through hands-on farming and land stewardship. Traveling to Homer and Willow, I worked with local growers as part of the World Wide Opportunities on Organic Farms (WWOOF) organization to better understand local agricultural practices in a tundra ecosystem. My background in soil and data science shaped my curiosity about sustainability on a micro-level, while previous farming experiences in Hawaii, Minnesota, and Ecuador guided my cross-cultural comparisons. Entering with few expectations, I aimed to immerse fully in place. My work included harvesting produce, preserving food, and caretaking animals. These experiences strengthened my adaptability, problem-solving, and confidence in supporting closed-loop food systems. This transformative internship was made possible by the Multicultural Alumni Network and the generosity of Alaskan hosts who welcomed me into their communities.

This experience was funded by Multicultural Alumni Network (MCAN) Fellows Program

Poster #9

Title: *Strategically Customizing Climate Action Plans using Social Marketing*

Presenter(s): Reese Anderson '26

Other Authors/Contributors: Mitchell Campbell (Lecturer in Psychology, Carleton College)

Supervisors and Institutional Affiliations: Mitchell Campbell (Lecturer in Psychology, Carleton College)

Purpose – Despite nearly half a century of global efforts, human contributions to climate change continue to rise. This paper aims to use a social marketing approach to identify specific actions and

interventions that are most effective for individual households based on four main identifiable traits. Design, methodology, and approach – We conducted qualitative background research and then designed and distributed a survey to identify specific trends in personal actions and mentalities regarding climate change. We then analyzed the variance in these trends along four identifiable scales to assist in choosing most effective interventions for individual households. Findings – There are both individual behaviors and generalized trends that vary based on household positions along our four scales – Utility Bill vs Climate Change Priority, Motivation, Social Class, and Education Level Originality and value – This research applies the social marketing approach to the climate change domain. This approach represents a novel way to advance climate action by prioritizing of specific action and behavior adjustment.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #8

Title: *Cyclin D1 Beyond The Cell Cycle: The Metabolic Regulation of ASS1 In t(11;14) Multiple Myeloma*

Presenter(s): Hans Anderson '26

Multiple myeloma (MM) is an incurable malignancy of plasma cells with diverse cytogenetic abnormalities. The t(11;14) subtype of MM is the most prevalent, making up 15% of cases, and results in the increased expression of the CCND1 gene through CCND1::IGH super-enhancer juxtaposition. Cyclin D1, encoded by CCND1, regulates the cell cycle but also alters gene expression through non-canonical functions. One such target gene is ASS1, a urea cycle enzyme involved in endogenous arginine synthesis, highlighting a potential link between CCND1 and metabolic regulation in t(11;14) MM. Non-canonical CCND1 function and arginine metabolism remain relatively unexplored in t(11;14) MM, representing potential therapeutic vulnerabilities.

This experience was funded by Pommerenke Endowed Internship Fund

Poster #7

Title: *Using the Cre-lox System to Investigate Lung Function and Disease in Mouse Models*

Presenter(s): Cyrus Anderson '28

The Cre-lox knockout system is a powerful genetic tool used to create tissue-specific gene knockouts in mice, enabling precise control of gene expression for experimental research. At the Sun Lab in the UCSD Cell and Developmental Biology Department, this system is used to manipulate transgene function in mice, particularly to study lung disease mechanisms. My role as an intern involved assisting in research that employed genetic techniques such as PCR genotyping and gel electrophoresis to characterize Cre-lox mice. This included genotyping offspring for loxP-flanked alleles and cre transgenes, crucial for later

experimental analysis. I also assisted in tissue preparation techniques, including paraffin and frozen sectioning, H&E staining, and immunofluorescence, to observe lung tissue morphology and protein expression. My work focused on sample preparation for imaging studies aimed at identifying pathogenesis-related abnormalities. While my research did not yield direct results, it significantly enhanced my technical proficiency and deepened my interest in biological research, inspiring my career aspirations in the field.

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

Poster #10

Title: *From the Courtroom to Change: Insights and Recommendations Through Court-Watching Protection from Abuse Hearings*

Presenter(s): Hannah Anderson-Brownlee '26

Through a partnership with the Center for the Study and Prevention of Gender-Based Violence at the University of Delaware, I spent the summer studying the process to get a protection from abuse order, which is a civil protection order that can be ordered by the judge in cases abuse. After observing hearings and coding the resulting data, we created a report for the court detailing recommendations for systemic improvement, focusing on security issues, making the court accessible for a wide range of litigants, and developing consistent standards across courtrooms.

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

Poster #11

Title: *Paced Mating Behavior After Altering D1:D2 Receptor Ratio Activation in Sexually Naive and Experienced Rats*

Presenter(s): David Appel '28, Jack Cieslowski '26, Maryjane Iteghete '28, Lily Watne '28

Other Authors/Contributors: Lily S. Watne '28, Sarah Meerts (Program Director of Neuroscience, Professor of Neuroscience and Psychology, Carleton College)

Supervisors and Institutional Affiliations: Sarah Meerts (Program Director of Neuroscience, Professor of Neuroscience and Psychology, Carleton College)

Sexual approach behaviors are initiated by activation of dopamine receptor type-1 (D1), and withdrawal behaviors by activation of dopamine receptor type-2 (D2). Sexually naive female rats exhibit longer contact return latencies to intromissions than sexually experienced rats, possibly due to a different ratio of D1:D2 activation. We aimed to induce patterns of sexual behavior in naive rats that are typically observed in sexually experienced rats by administering SKF38393, a D1 agonist, or Eticlopride, a D2

antagonist. In Experiment 1, sexually naïve ovariectomized Long-Evans female rats were administered either SKF38393 or saline. Naïve female rats with SKF exhibited shorter contact return latencies to intromission and ejaculation. In Experiment 2, ovariectomized naïve and experienced female Long-Evans rats were administered either Eticlopride, a D2 antagonist, or saline. No significant effect of eticlopride was found between groups. Future research should examine how D2 antagonism affects withdrawal behavior in naïve and experienced rats.

This experience was funded by Psychology Department at Carleton College

Poster #12

Title: *Development and Grant Writing Internship at Red Hen Press*

Presenter(s): Defne Arat '27

I was an intern at the development and grant writing office of Red Hen Press for more than three months this year, which was an incredible opportunity to learn more about how a non-profit, independent publishing house operates financially. Although it wasn't exactly an editorial role, it taught me a lot about the industry and about business and advertisement writing through applying to different grants.

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

Poster #13

Title: *Exploring Equivalent Width Precision Limits in the HPF Spectrograph*

Presenter(s): Roan Arendtsz '27

Other Authors/Contributors: Ryan Terrien (Professor of Physics and Astronomy, Carleton College)

Supervisors and Institutional Affiliations: Ryan Terrien (Professor of Physics and Astronomy, Carleton College)

In stellar spectroscopy, precise measurements of spectral line strength, such as the equivalent width, enable the recovery of important physical parameters, including the stellar rotation period. In this study, we explore the limitations of such precision using spectra from the Habitable-Zone Planet Finder (HPF). We present a "ratio correction" method that removes uncontrolled low-frequency variations in the spectra over time. Our method significantly improves the repeatability of equivalent width measurements on short timescales (<1 hour), increasing precision by up to a factor of 3.2 and approaching the fundamental noise limit. Moreover, we more reliably detect line strength modulation attributable to the rotation of magnetically active regions, recovering established periods for the stars GJ 699 and Teegarden's Star, while discovering a rotation period of 97.66 ± 1.11 days for GJ 1093. Our

results suggest a straightforward method for accounting for instrumental throughput variation in HPF and other spectrometers.

This experience was funded by NSF Astronomy + Astrophysics Grants, Grant no. 2108569

Poster #14

Title: *Selective ¹⁵N Isotopic Labeling For Large HIV RNA NMR*

Presenter(s): Rocio Avila '26

Other Authors/Contributors: Rocio Avila '26, Rokeebah Oguntoye², Solomon K Attionu, Miza Shalabi, Alessandro Marotto, Christoph Kreutz, Kwaku Dayie, Carleton College, Department of Chemistry and Biochemistry of University of Maryland, Department of Biochemistry and Biophysic Perelm

Supervisors and Institutional Affiliations: Dayie Kwaku (Professor of Chemistry, University of Maryland)

HIV RNA is highly dynamic and capable of adopting alternative conformations that are involved in distinct steps of the viral life cycle (Levintov and Vashisth, 2024). Nuclear magnetic resonance (NMR) spectroscopy is a powerful technique for probing RNA structure and dynamics. However, studying large RNAs presents significant challenges. As RNA size increases, spectral crowding and peak broadening reduce resolution and complicate data interpretation (Dayie et al., 2022). These difficulties are primarily due to intrinsic NMR properties such as large chemical shift anisotropy (CSA) and strong dipole–dipole (DD) couplings, both of which hinder structural analysis of high molecular weight RNAs (Dayie et al., 2022; Hilber et al., 2025). To overcome these obstacles, nucleotide-specific labeling strategies have been developed (Dayie et al., 2022; Shah et al., 2025; Attionu et al., 2025). Such labeling narrows ¹H resonances, reduces spectral overlap, and enables clearer observation of structural features (Hilber et al., 2025). Prior work has demonstrated the successful incorporation of selective ⁹⁻¹⁵N labeled GTP into large RNAs (Attionu et al., 2025). In this study, we extend this approach by applying nucleotide-specific labeling to adenine, to further expand the toolkit for NMR analysis of larger RNAs.

This experience was funded by Trustee Endowed Internship Fund

Poster #15

Title: *Reverse Engineering Plate Reader Data for Backend Coding*

Presenter(s): Rachel Azan '26

Other Authors/Contributors: Marielle Russo (Microbiology Phd Student, Massachusetts Institute of Technology.)

Supervisors and Institutional Affiliations: Marielle Russo (Microbiology Phd Student, Massachusetts Institute of Technology.)

Conducted data analysis on a Clariostar platereader machine, through analysing sytem log data and finding patterns to understand how input combinations affect output data. My aim was to contribute this data to help them implement their own feedback control systems so that they can adjust experimental testing in real time. The hope is to eventually aid in the development for unified experiments in the lab for protein evolution through combinations of computational and experimental approaches.

This experience was funded by Class of 1970 Endowed Internship Fund

Poster #16

Title: *DKT International: Combining SRH and Marketing*

Presenter(s): Lydia Bacigalupo '26

My internship at DKT International revealed how marketing can be powerfully applied to sexual and reproductive health (SRH), blending communication skills with meaningful impact. Through projects in communications, donor management, and research, I gained hands-on experience and solidified my interest in pursuing a nonprofit career. Come learn about how marketing can be used as a force for good!

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

Poster #17

Title: *Cultural Research in Iceland*

Presenter(s): Laure Back '27

During my field research internship in Iceland, I explored the intersection of culture, community, and tourism as part of the Trails & Secrets of Iceland publication. My research focused on two topics: the role of geothermal pools as social and cultural gathering spaces, and the revival of Icelandic folklore through the country's growing tourism industry. Through on-site fieldwork, interviews, and cultural observation across Reykjavik, the Golden Circle, and South Iceland, I examined how these aspects reflect Iceland's balance between tradition and modernity.

This experience was funded by Voyager Endowed Internship Fund

Poster #18

Title: *Urban Tree Equity in the Bay Area*

Presenter(s): Jonah Barer '26

This summer I conducted independent research on urban climate resilience with a focus on shade equity. As global temperatures rise, cities are becoming increasingly vulnerable to extreme heat, and lower-income neighborhoods often face the highest risks due to limited tree cover, parks, and shaded infrastructure. My project examined how cities, particularly in the Bay Area, are addressing these challenges. I began with background research on heat mitigation strategies, then conducted site visits to evaluate successful and unsuccessful public spaces. To broaden my perspective, I studied international case studies of innovative shade and cooling interventions. I also interviewed Bay Area specialists to better understand the roles of community involvement and biophilic design in shaping resilient, equitable spaces. This project highlights the need for integrated approaches that combine natural and built shading while ensuring community voices are central. Lessons learned will inform future planning work in Northfield, Minnesota and beyond.

This experience was funded by Independent Research Fellowship

Poster #19

Title: *Teaching Shakespeare: Theater and Twelfth Night*

Presenter(s): Jack Bartlett '27, Kaelyn Rothe '27

Other Authors/Contributors: Andrew Carlson (Associate Professor of Theater, Chair of Theater and Dance, Carleton College) Lizzie Coy-Bjork '27, Caroline Stanton '27

We worked with the Great River Shakespeare Festival to run a series of programs for students aged 5-18 to develop acting techniques, learn to analyze Shakespeare's text, and practice improvisational skills, culminating in a performance of Shakespeare's Twelfth Night and several smaller Shakespeare-inspired plays for the younger actors.

This experience was funded by Sam '75 and Meg Woodside Endowed Fund for Career Exploration and the Waterbury Endowed Internship Fund

Poster #20

Title: *Juneau Icefield Research Program*

Presenter(s): Peter Berganross '26

Other Authors/Contributors: Sarah Fortner (Director of Sustainability, Carleton College)

I spent the summer assisting with glaciology, climate science, and geophysics research across the Juneau Icefield as a part of the 8-week Juneau Icefield Research Program within the Foundation for Glacial and Environmental Research. The research program has run for 79 years allowing students to have year to year comparisons and contribute to decadal data records, specifically for glacial mass balance. This summer, research focuses included understanding the formation of ogives, glacial mass balance, rockfall interactions with glaciers, paleoclimate, downstream impacts of accelerated glacial melt and glacial hydrology (specifically supra-glacial lakes and englacial aquifers). The program was based around a ski traverse from Juneau, AK to Atlin, BC, and included many learning and practicing mountaineering and glacial safety skills, such as crevasse rescue, haul systems, and self-arresting.

This experience was funded by Class of 1964 Endowed Internship Fund

Poster #21

Title: *Developing and Designing an Autonomous Underwater Vehicle*

Presenter(s): Bryce Bernstein '26

Other Authors/Contributors: Chelsey Edge (Assistant Professor of Computer Science, Carleton College), Conrado Peña Lemes '27

Supervisors and Institutional Affiliations: Chelsey Edge (Assistant Professor of Computer Science, Carleton College)

Autonomous Underwater Vehicles are often used for various underwater activities that pose a danger to human life. However, these tools remain inaccessible to those with limited funding due to their high price tags, which often exceed \$100,000, and their closed-source nature. The LoCO AUV, designed by the IRV Lab at University of Minnesota, seeks to alleviate these issues by offering an open-source and relatively affordable solution. The LoCO AUV debuted in 2019, but, in the years since its release, many of its parts have been phased out by manufacturers and the underlying software that it uses, the Robot Operating System (ROS), ended support in favor of a newer update, ROS2. In our research, we updated the libraries that depended on ROS to support ROS2 and updated the interior components to house newer parts in an enclosure that is smaller than was used for the original LoCO AUV.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #22

Title: *Transfection of CRISPR-A Constructs into N2A Mouse Cell Lines to Increase CHD8 Expression*

Presenter(s): Pranit Bhuvan '28

Other Authors/Contributors: Alexander Nord (Professor of Neuroscience, University of California Davis), Liam Davis '27 (UC Davis), Cesar Estrella '27 (UC Davis)

CHD8 is a gene that has been found to be highly connected to neurodevelopmental disorders such as Autism-Spectrum Disorders (ASD). The CHD8 gene is responsible for producing Chromodomain Helicase 55 DNA-binding protein 8, which regulates other high confidence risk ASD genes by changing the availability of the chromatin for transcription. In haploinsufficient cases the chromosome is unavailable for transcription leading to complications in early development, such as macrocephaly. A hypothesized form of gene therapy pathway involves the usage of synthesized gene activators that will increase expression of the CHD8 gene. By creating and validating a protocol for the transfection of a dCas9a construct in mouse N2A cells we hypothesize that there will be an increase in the transcription of the CHD8 gene. The project includes the cloning of multiple candidate gRNA strands, used to figure out which is suited best for the dCas9a complex that ultimately results in the most expression of the CHD8 gene.

This experience was funded by Trustee Endowed Internship Fund

Poster #23

Title: *Can Disturbance Signals be Detected and Purged to Improve Paleoclimate Fidelity of Thuja occidentalis Tree Ring Chronologies?*

Presenter(s): Nico Bolling '27

We attempt to fingerprint and remove tree-ring signals of fire disturbance in survivors in *T. occidentalis*, which has the potential to produce a robust paleoclimate record in the area. Despite being fire intolerant, long-lived individuals are often found on fire borders. We collected *T. occidentalis* tree-ring cores from 38 living trees from around Lake Insula. We compared population mean tree growth for stands in and out of a burn area to determine fire impacts. We hypothesized that *T. occidentalis* would have a clear, disturbance-related suppression-release pattern. Identifying specific disturbance effects on *T. occidentalis* growth can inform approaches to purging disturbance signals from longer chronologies. This technique may be crucial for efforts to produce a network of dendroclimate records from the forests of Northern Minnesota, where disturbances abound.

This experience was funded by Jackson and Warren Endowed Internship Fund

Poster #24

Title: *Interning at Advanced Ophthalmology of Michiana*

Presenter(s): Anna Borkowski '26

This summer, I interned at an eye doctor's office called Advanced Ophthalmology of Michiana. From this internship, I learned that I want to pursue optometry for graduate school.

This experience was funded by Jackson and Warren Endowed Internship Fund

Poster #25

Title: *Isolation of Human PBMCs and Checking Expression of Neuropilin-2 using Immunofluorescence*

Presenter(s): Ahana Bose '27

This summer, I isolated human peripheral blood mononuclear cells (PBMCs) and stained the cells using immunofluorescence. To isolate PBMCs, I learned the protocol and the technique of obtaining them from blood and then freezing the PBMCs. Obtaining PBMCs was via a Ficoll separation, which separates the blood into layers. I adhered the cells using adhesion slides. The staining procedure involved various primary and secondary antibodies. After staining, I imaged the slides using a Nikon microscope. The results allowed me to understand the expression of the markers such as CD3, CD19, and CD20. I looked at neuropilin-2 (NRP2) stains on T-cells to see if they were expressed on CD4 cells. I learned more about primary and secondary antibodies and how they interact to give the fluorescence signal captured in a fluorescence microscope. I helped standardize the procedure, so the laboratory can continue using the protocol for further research.

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

Poster #26

Title: *New York State Psychiatric Institute Internship*

Presenter(s): Vivian Bradner-Young '26

The New York State Psychiatric Institute at Columbia University Medical Center provides free psychiatric treatment to patients in New York. I worked with psychiatry residents to assist with patient intake and therapeutic analysis. Together, we screened over 100 patients to be seen at the clinic. I also attended multiple training sessions on Cognitive Behavioral Therapy, Dialectic Behavioral Therapy, and Interpersonal Psychotherapy. These trainings involved learning how to administer treatment and analyzing several sample cases.

This experience was funded by Class of 1970 Endowed Internship Fund

Poster #27

Title: *Summer Internship at the New Mexico Immigrant Law Center*

Presenter(s): Tony Brown '27

During this internship, I worked at the New Mexico Immigrant Law Center. I primarily did work related to our specific client's case, specifically helping him complete documents to prepare him for his final hearing. Additionally, I frequently visited the detention center he was at to help gather details for his case. For other visits, we would give intake forms and Know-Your-Rights presentations to a bigger group of detainees. Finally, we met with other activist groups based in New Mexico who were fighting the same unjust system we were.

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

Poster #28

Title: *Hatching Dynamics in Schistocephalus solidus are Influenced by the Timing of Egg Laying*

Presenter(s): Claire Burbery '26

Other Authors/Contributors: Edith Reyes Contreras '25, Peaches Cooper '27, Shira Dubin '25, Josh Sampson '26, Amanda Hund (Assistant Professor of Biology, Carleton College)

Supervisors and Institutional Affiliations: Amanda Hund (Assistant Professor of Biology, Carleton College)

Schistocephalus solidus is a complex parasite whose intermediate hosts include copepods, three-spined stickleback, and piscivorous birds. *S. solidus* reproduces inside the bird gut, producing eggs for 8-9 days, and eggs are then released in fecal matter. Copepods are infected by the coracidia that hatch from these eggs. We were interested in learning more about the hatching dynamics of these eggs and whether eggs from certain days within the laying period of 8-9 days release coracidia differently. In this experiment, we allowed eggs from different tapeworm crosses to hatch in 24-well plates. Following a two-week incubation period in the dark and in a day/night cycle, we collected daily data on how many coracidia were in each well. Our results showed that egg lay date influences hatching dynamics, with eggs from earlier lay dates hatching quicker and longer than eggs from later lay dates.

This experience was funded by NSF Grant (Award #2243076), Frank Ludwig Rosenow Fund

Poster #29

Title: *Software Engineering Internship*

Presenter(s): Henry Burkhardt '26

I was an AI/ML intern at a tech company in new york.

This experience was funded by Solhem Business Fellowship Fund

Poster #30

Title: *Beyond Displays: Discovering the Backrooms of the Dennon Museum Center*

Presenter(s): Lily Burrows '26

Over the course of two months, Burrows worked in the Inuit art collections at the Dennon Museum Center in Traverse City, Michigan. Absorbing the information around them without any particular research question in mind, as this was not a research experience, Burrows learned about Inuit life and culture through the art of it people. Burrows is left wondering why such an extensive collection of Inuit art exists outside of the Arctic circle, with no direct connections to the Inuit people, and the museums role in educating its visitors on such matters.

This experience was funded by Lilly Bayard Fund Supporting Research and Study

Poster #31

Title: *Intermittent Fasting Mitigates Pulmonary Vascular Disease Severity in a Preclinical Model of Pulmonary Hypertension due to Lung Disease*

Presenter(s): Peter Calabrese '26

Group 3 pulmonary hypertension (PH) is a subtype of PH that occurs in chronic lung disease and has an abysmal average survival rate of 2-3 years. Although Group 3 PH is the second most common form of PH, therapeutic options are limited, as the only approved treatment (inhaled treprostinil) does not meaningfully extend survival. We previously demonstrated that intermittent fasting prolongs survival in Group 1 PH (pulmonary arterial hypertension). Our current aim is to determine whether intermittent fasting alleviates Group 3 PH in a preclinical model.

This experience was funded by Pommerenke Endowed Internship Fund

Poster #32

Title: *Gamma-ray Spectroscopy with High Purity Germanium Detectors*

Presenter(s): Foster Carroll '27

The Black Hills Underground Campus (BHUC) is a lab located at the Sanford Underground Research Facility (SURF) in Lead, SD. The BHUC is on the 4850' level of SURF and houses 5 high-purity germanium detectors used for measuring the radioactivity of materials to be used in an array of underground physics experiments. This summer we moved the BHUC from a temporary location back to its permanent setup. This involved moving multiple high purity germanium crystals and around 57,000 pounds of lead bricks. In addition to rebuilding the BHUC, we also developed software for determining the concentration of radioactive elements such as U, Th, and K present in samples.

Poster #33

Title: *The Role of IFN- γ and Dendritic Cells in the Immune Response to FVIII*

Presenter(s): Jodie Chan '28

Hemophilia A is an X-linked inherited bleeding disorder defined by a deficiency in clotting factor VIII (FVIII). Individuals with hemophilia A have bleeding episodes that require infusions of the FVIII protein. 30% of people with severe hemophilia A develop neutralizing anti-FVIII antibodies, rendering FVIII therapy ineffective. Dendritic cells (DCs) take up FVIII and activate naive CD4+ T cells, which present to B cells for antibody production. We aimed to investigate whether IFN- γ (interferon-gamma), an inflammatory cytokine, regulates dendritic cell maturation under FVIII exposure, and to identify which cDC (conventional DC) subset primarily takes up FVIII. Murine bone marrow-derived DCs were cultured for six days and then incubated with FVIII for uptake analysis with flow cytometry, or treated with cytokines for 24 hours and subsequently analyzed for FVIII uptake. cDC2 was the main DC subset that takes up FVIII. IFN- γ reduced DC maturation, and IFN- γ and LPS treatment reduced FVIII uptake.

This experience was funded by Robert J. Kolenkow and Robert A. Reitz Endowed Fund for Student Scientific Research

Poster #34

Title: *Cross-presented serine proteases as immunotherapy targets for lung cancer and osteosarcoma*

Presenter(s): Lauren Chauv '27

Other Authors/Contributors: Avery Hsu '27, Naomi Karavias '29, Martin Navarro '26, Aleko Thomas '27, Lisa St. John, Olawunmi Osilesi, Rudy Lanete, Gheath Al-Atrash, Alison Gibson, Pariya Sukhumalchandra

Currently, tumor-specific immunotherapy for non-small cell lung cancer (NSCLC) and osteosarcoma (OS) has been limited due to a lack of targetable tumor antigens. However, neutrophil serine proteases (NSP) found in myeloid azurophil granules, specifically proteinase 3 (P3), neutrophil elastase (NE), and cathepsin G (CG), are effective targets in hematological malignancies such as acute myeloid leukemia (AML) and other solid tumor malignancies. These azurophil granule proteases are endogenously expressed in myeloid hematological malignancies but not in solid tumor malignancies, such as NSCLC and OS. In NSCLC and OS, CG, NE, and P3 are prevalent in the serine proteases in the tumor microenvironment (TME), and are cross-presented on the cell surface. The process of cross-presentation is an immunological mechanism where exogenous antigens are taken up and presented on the cell surface by HLA class I molecules. This process offers a novel potential strategy for targeting NSCLC and OS.

Poster #35

Title: *Selective Activation of the Orexin Pathway: SA8Y7S as a Potential Therapy for Colon Cancer via OX1R*

Presenter(s): Kaitlyn Chen '26

My main tasks during this internship included learning how to do cell culture, cell treatment transfection, BRET assays, cell counting, and shadowing different members of the lab to learn more about their varying projects or experiments. For example, how they use the flow cytometer, take care of the mice for future experiments, and perform site directed mutagenesis. In addition, I attended scientific presentations by interns completing their master program in French. Overall, I had a very well rounded learning experience internship blending hands on experience with learning opportunities.

This experience was funded by Abeona Endowed Fund for International Internships

Poster #36

Title: *Role of Septin 4, 5, and 7 in the Development of Cardiac Fibrosis*

Presenter(s): Selina Chen '26

Cardiac fibrosis is a key pathological feature of heart failure, yet the molecular mechanisms regulating this process remain incompletely understood. Septins are GTP-binding cytoskeletal proteins with emerging roles in cellular organization and signaling. Our prior work identified Septin4 as a regulator of cardiac fibrosis; however, the roles of related isoforms remain unclear. In this study, we investigated the contribution of Septin4, Septin5, and Septin7 to fibrosis using mouse embryonic fibroblasts (MEFs) as a model system. Cells were treated with angiotensin II and subsequently stimulated with TGF- β to induce pro-fibrotic signaling. Protein expression and activity of septin isoforms were assessed by western blotting. Preliminary results indicate that Septin5 and Septin7 expression may be modestly upregulated

under these conditions, suggesting a potential involvement in the fibrotic response. These findings support further exploration of septin isoform interactions in cardiac fibrosis and highlight the need to define their specific molecular mechanisms.

This experience was funded by Multicultural Alumni Network (MCAN) Fellows Program

Poster #37

Title: *Entropy Growth and Operator Complexity in Quantum Walks: From Integrability to Chaos*

Presenter(s): Long Cheng '28

Other Authors/Contributors: Arjendu Pattanayak (Professor of Physics, Carleton College)

Supervisors and Institutional Affiliations: Arjendu Pattanayak (Professor of Physics, Carleton College)

We investigate how different types of coin operators influence entropy generation in discrete-time quantum walks on a one-dimensional lattice. We focus on two important cases: a tunable Harper-type coin operator controlled by parameter g , and completely random Haar-distributed coin operators. The Harper coin allows us to explore a continuous transition from integrable to chaotic regimes by adjusting the single parameter g , while the Haar-random coins represent maximally chaotic behavior. For small values of g , the system displays characteristics of integrable systems with slow, constrained entropy growth. We observe a gradual transition to faster entropy generation with increasing g , eventually reaching saturation at large g values where the behavior matches that of fully chaotic Haar-random coins. We examine the spectral properties of the coin operators through the quantity $K = \text{Tr}(U \log U)$, which serves as a measure of operator complexity. Our analysis reveals a strong correlation between this operator complexity measure and the observed entropy growth rates. The Harper model emerges as particularly valuable, offering a smooth, controllable pathway between integrable and chaotic regimes with a single parameter. Our results also show that entropy growth rates in walks serve as effective experimental signatures for detecting and characterizing quantum chaos in these systems. Further, the relationship we establish between operator complexity (as measured by K) and dynamical entropy generation suggests new approaches for analyzing complexity in quantum systems more generally.

This experience was funded by Physics Department Endowment Fund

Poster #38

Title: *On the Resolvent Degree of $PSU(3, q)$.*

Presenter(s): Pablo Christofferson '26, Ella Kuriyama '26

Other Authors/Contributors: Claudio Gómez-González (Assistant Professor of Mathematics, Carleton College), Akash Ganguly '25, Yihan Carmen Li '28

Supervisors and Institutional Affiliations: Claudio Gómez-González (Assistant Professor of Mathematics, Carleton College)

Resolvent degree (RD) is an invariant of finite groups in terms of the complexity of their algebraic actions. We address the problem of bounding $RD(G)$ for all finite simple groups using the methods established in [GGSW24] in terms of $RD^{\leq d}_{\mathbb{C}}$ -versality and special points. We give upper bounds on $RD(PSU(3, q))$ and $RD(PSU(2, q))$ in terms of classical invariant theory. In the $PSU(3, q)$ case, stability of low-degree invariants permit an asymptotic bound on RD growing in q .

This experience was funded by NSF Grant DMS-2418943

Poster #39

Title: *Housing Policy and Research Internship at NHC*

Presenter(s): Joanne Chung '26

Over the summer, I worked with a non-profit focused on federal housing policy, the National Housing Conference (NHC). Based in D.C., I supported research on housing affordability alongside my research supervisor. My main project included data analysis for the quarterly Paycheck to Paycheck report, which compares housing costs and incomes across 390 metropolitan statistical areas in the U.S. While experimenting with RStudio and GIS, I created visuals, including heat maps and GIFs, to exemplify rent burdens and homeownership requirements in various geographical contexts. My visuals aimed to tell a story that contextualizes the challenges many households face in securing affordable housing. In addition to working with HUD data I also researched how federal housing policy, such as the ROAD to Housing Act, and the Big Beautiful Bill, would change LIHTC funding and development in the coming years.

This experience was funded by Multicultural Alumni Network (MCAN) Fellows Program

Poster #40

Title: *Chart Review of Video Fluoroscopic Swallow Studies in BWH's Level III NICU*

Presenter(s): Sam Chutkow '26

Feeding difficulties are common among preterm and high-risk neonates in the NICU, often due to immature suck–swallow–breath coordination and risk of silent aspiration. This retrospective chart review examined infants admitted ≥ 72 hours to a level III NICU from July 2022 to June 2025 who underwent videofluoroscopic swallow studies (VFSS). Of 820 eligible infants, 10% received VFSS; 60% demonstrated aspiration, yet most were discharged on oral feeds with compensations such as thickened liquids or slower-flow nipples. Overall, 75% of VFSS recipients achieved full oral feeding by discharge, 20% required partial oral plus gastrostomy, and 5% were discharged NPO. Aspirators took longer to transition to full PO than non-aspirators but frequently succeeded by discharge. Findings highlight VFSS as a valuable diagnostic tool, not a “pass/fail” measure, that guides individualized discharge planning and supports safe feeding outcomes in this vulnerable population

This experience was funded by Wiebolt Endowed Internship Fund

Poster #41

Title: *The Politics of Black Empowerment in the Americana Aesthetics of Beyoncé*

Presenter(s): Makayla Clark '27

During Beyoncé's June 2025 Cowboy Carter tour stop in Paris, her team highlighted the outfits from her extravagant performance at the Stade de France arena. Included were photos of Beyoncé's commemorative Buffalo Soldiers shirt in honor of Juneteenth. This symbol of solidarity soon became an object of controversy due to text that identified “Warring Indians” and “Mexican Revolutionaries” as enemies of the peace. Such violent rhetoric reinforces neoliberal values and exclusionary politics. Furthermore, it implies that the acquisition of colonial power and capital wealth for African Americans will lead to ultimate salvation. My research intervenes in the larger study of black feminist scholarship by problematizing the notion that aesthetic recognition (i.e. Beyoncé's Americana shirts, merch and brand deals) is one of the most productive strategies for uplifting racialized minorities. I draw on religious studies to explore how aesthetics, under racial capitalism, could be understood as religious cultural production, with spiritual value.

This experience was funded by Mellon Mays Undergraduate Fellowship

Poster #42

Title: *Understanding The Just Wage Framework*

Presenter(s): Will Clausman '26

Supervisors and Institutional Affiliations: Daniel Graff (Professor of History, University of Notre Dame)

The American political economy is largely defined by worker-capitalist relations, in which labor is commoditized for a wage. However: this wage is marked by exploitation, unsafe working conditions, authoritarianism in the workplace, and rampant inequality. The Just Wage Framework seeks to understand what makes a wage just (or unjust) through synthesizing Catholic Social Teaching (CST) with breakthroughs in various fields in social sciences (including but not limited to: history, political science, economics, psychology, sociology and anthropology and labor studies) to analyze problems with the contemporary American workplace and possible solutions to these problems. Furthermore, keeping in line with CST's teachings on wages, we argue that a wage is not simply the paycheck that workers receive, nor does a wage simply encompass a paycheck and certain benefits that a job grants employees (such as healthcare), rather a wage is an all encompassing experience in a workplace as well as compensation. The Just Wage Project has found several criteria to analyze a wage to understand to what extent (if any) it can be considered "just." A Just Wage enables a decent life for a worker and their household, allows for asset building, provides basic social security for worker and household, is non discriminatory, is not excessive, facilitates participation for workers, and is rewarded based on performance, qualification, and type of work.

Poster #43

Title: *Fred Hutch Cancer Center: Small Cell Lung Cancer Research*

Presenter(s): Rose Combs '28

I spent six weeks interning in the Lampe Lab, which looks at post-translational modifications (PTMs) as targets for antibody therapies for small cell lung cancer. We primarily looked at citrullination, which is a change to an amino acid that only occurs in cancer cells. While there, I participated in three different projects. In the first, I tested whether breast cancer plasma samples responded to PTM more than the wild type (WT) of a peptide to identify samples that we could extract antibodies from. The second was to test whether rabbits injected with citrullinated peptides responded more to the PTM over the WT, from their plasma samples. This data helped the PIs decide which rabbits to keep in the study. Finally, I tested 35 antibodies the lab designed to see if they bound more to PTM over WT of CA9, SPINT2, and TFRC proteins.

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

Poster #44

Title: *Project Machu Asillo: Inca Sector, 2025*

Presenter(s): Suwannee Conroy-Baarsch '26, Jesse Cogan '27

Other Authors/Contributors: Sarah Kennedy (Assistant Professor of Archaeology and Latin American Studies, Carleton College), and Henry Paret '25

Supervisors and Institutional Affiliations: Sarah Kennedy (Assistant Professor of Archaeology and Latin American Studies, Carleton College)

Machu Asillo, a Late Intermediate Period hillfort (~1000 -1400 CE) is located in the Altiplano (high-plains) of southern Peru in the northern Lake Titicaca Basin. Research carried out in the 2025 field season was specifically focused on the Inca sector of the site, allowing researchers to investigate processes of Inca imperial expansion in the region. The site is mentioned in multiple colonial documents as a Colla stronghold during a large-scale rebellion against the Inca. Thus, the site provides information on possible resistance carried out by the Colla as the Inca conquered the region in the Late Horizon Period (~1400-1533 CE). The site contains a complex of ceremonial Inca architecture, suggesting possible Inca commemoration of their eventual victory. During the excavation, various styles of ceramic pottery, lithics and obsidian, metal, and some animal bone were found, shedding light on the potential uses of the site and proposing further research questions.

This experience was funded by Humanities Center Student Research, Parents Fund

Poster #45

Title: *Historical Preservation Advocacy & Education, Summer 2025 at Historic Seattle*

Presenter(s): Caroline Cooper '26

As the Historic Preservation Research and Education Intern for Historic Seattle, I engaged in digital and archival research to support masonry repair grants for a historical landmark in the Beacon Hill neighborhood of Seattle.

I worked with advocacy and programming staff to plan an educational program in the form of a public open house to share the history and significance of the former Black Estate. My research culminated in two educational posters that addressed the cultural, architectural, and site history of the former Black Estate and the historic landmarks now located on the Harwood Condominium property.

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

Poster #46

Title: *Broadcasting with the Bethesda Big Train*

Presenter(s): Jackson Corcoran '26

I served as one of the Bethesda Big Train Baseball Club's primary broadcasters for their 2025 season as a Tim Kurkjian Media Fellow. I served as play-by-play announcer, color commentator, and recorded content for social media and between livestreamed innings. As part of my role, I volunteered to create daily game notes for use by broadcasters and team writers, a media guide, and a statistical recap

This experience was funded by Neil Isaacs and Frank Wright '50 Fellowship in Investigative Journalism

Poster #47

Title: *All The World's A Stage" - Teaching At the Great River Shakespeare Festival In Winona Minnesota*

Presenter(s): Lizzie Coy-Bjork '27, Caroline Stanton '27

Other Authors/Contributors: Andrew Carlson (Professor of Theater, Chair of Theater and Dance, Carleton College), Jack Bartlett '27, Kaelyn Rothe '26

We were education interns at the Great River Shakespeare Festival in Winona Minnesota. This is the largest equity theater outside of the Twin Cities in Minnesota. For over one month, we worked with three groups of students ages 4-18, with each group culminating in a performance of a Shakespeare or Shakespeare-inspired work. The primary group we worked with was Shakespeare for Young Actors (SYA), who are ages 12-18, on their production of Twelfth Night. We worked alongside Andrew Carlson and several professional actors and company members to make this program a success.

This experience was funded by Sam '75 and Meg Woodside Endowed Fund for Career Exploration and Waterbury Endowed Internship Fund

Poster #48

Title: *Murray Research Archive Data Intern*

Presenter(s): Karla Cruz Sanchez '26

This summer, I worked as a data intern for the Murray Research Archive, where I restored published articles from a database over 20 years old at Harvard, utilizing data from the Original Murray Collection, a collection of multidisciplinary research studies. My internship involved searching numerous credible sources, guided by my supervisors, and developing research skills to effectively identify and store metadata for over 1900 related publications in the Dataverse. The Dataverse is an extensive database at

Harvard, established in 2006, that enables researchers to publish their data. At the same time, the Original Murray Research Archive collection consists of social and behavioral research dating back to 1911. My internship focused on cross-referencing data from these publications with data collections from the Original Murray Collection. This approach enabled the proper storage of relevant publication data, including citations with dates of publication, authors, and, where available, DOI links—encouraging me to gain knowledge about locating, sourcing, and implementing key details with limited information. But most importantly, I've discovered a newfound patience required in executing such tasks.

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

Poster #49

Title: *University of Michigan Psychoneuroimmunology Lab - Funded Summer Internship*

Presenter(s): Dylann Cullinane '26

I spent summer 2025 working as a research assistant under Dr. Annelise Madison at the Michigan Psychoneuroimmunology Lab at the University of Michigan. My focus primarily revolved around the lab's current MOXIE study, or the Multimodal eXploration of challenges in Interactive Environments. We physiologically and psychologically investigated the human stress response using the Trier Social Stress Test and a political debate as distressing stimuli. Participant data were collected through self-reported surveys, BIOPAC physiological measurements, and salivary and blood samples. Key takeaways from my internship experience include the complexity of human subjects research and the importance of collaboration across disciplines within multimodal investigation. My work in the PNI lab confirmed my interest to pursue a career that includes hands-on experimentation, biological and psychological investigation, and human-focused care and interaction.

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

Poster #50

Title: *Moderate Levels of Lead Exposure May Impair Learning, Cognitive Flexibility, and Long-term Memory in Young Mice*

Presenter(s): Dylann Cullinane '26, Eunseo Jung '26, Eleanor Johnson '26, Dean Watkins '26

Other Authors/Contributors: Gisel Flores-Montoya (Assistant Professor of Psychology, Carleton College), Keya Mookencherry '25

Supervisors and Institutional Affiliations: Gisel Flores-Montoya (Assistant Professor of Psychology, Carleton College)

Chronic childhood exposure to the neurotoxin lead (Pb), even at blood levels as low as 3.5µg/dL, has been shown to impair memory, cognition, and cognitive flexibility through adulthood. Previous investigation into the impact of low-level Pb exposure in a C57BL/6J mouse model has found positive correlations between blood lead levels (BLLs) and increased exploratory activity during nose-poke and open field tests. However, BLLs have also been found to be negatively correlated with long-term memory, adaptation to task reversal, and learning rates. The present study aims to replicate and build upon such findings in order to further characterize cognitive deficits following early-life chronic Pb exposure in a mouse model. We randomly exposed thirteen male mice to either 0 ppm or 430 ppm Pb via dam's drinking water from birth until weaning at postnatal day (PND) 21, followed by exposure through their own drinking water until PND 28. On PND 21, all mice underwent open field and nose-poke tests, followed by a sand-digging (SD) test from PND 28 through PND 53. As initial preliminary analyses, independent sample t-tests were used to examine potential significant differences between groups. Preliminary results suggested that Pb-exposed mice were more likely to make errors during initial learning, reversal, and long-term recall phases of the SD test, indicating possible deficits in cognitive flexibility, learning, and long-term memory. Further analyses with a larger sample size controlling for factors such as day of testing, litter effects, and a potential olfactory preference are necessary at this time in order to draw conclusions. Additional video ratings of testing trials and statistical analyses will be performed to more comprehensively explore the impact of Pb exposure on exploratory behavior, learning, and cognitive flexibility, allowing us to pursue our lab's ultimate goal of conducting foundational studies to aid in the development of treatment for childhood lead exposure.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences, Hewlett & Mellon Fund for Faculty Development

Poster #51

Title: *Republican China at Bretton Woods*

Presenter(s): Aidan Cunningham '26

Other Authors/Contributors: Seungjoo Yoon (Associate Professor of History, Carleton College), Victor Almeida (Assistant Professor of Economics, Carleton College)

In 1943, when John Maynard Keynes and Harry White submitted their respective proposals for what became the Bretton Woods system, China was one of only a handful of countries to submit a formal alternative plan. My project was to analyze this memorandum, located among Princeton University's Harry Dexter White Papers, alongside archival documents in the IMF archives in Washington D.C. and in the Academia Historica (Guo Shi Guan) in Taipei to develop a more thorough understanding of Chinese aspirations for a post-war order and of how developing economies advocated for themselves at the close of the Second World War.

This experience was funded by Independent Research Fellowship

Poster #52

Title: *Interning at the Paris Country Club*

Presenter(s): Charlotte Darras '27

For my internship over the summer, I was placed at the Paris Country Club. During this internship, I had the opportunity to learn about management in a company such as this one, as well as working heavily with children. This experience gave me a new perspective on working in a team with people from different backgrounds, which will prove to be helpful for the rest of my time here at Carleton and in the future.

This experience was funded by M. Leith Shackel Internship Endowment Fund

Poster #53

Title: *Investigating the role of translesion synthesis polymerases on translocations at interstitial telomere-like sites in *Saccharomyces cerevisiae**

Presenter(s): Nicole Dawson '26

Other Authors/Contributors: David Gonzalez, Katherine L. Friedman

DNA double-strand breaks (DSBs) threaten genome stability, and inaccurate repair is linked to disease. Resection of DSBs produces 3' overhangs that can resemble natural chromosome ends, where telomerase adds telomeres. At breaks, resection to nearest telomere-like sequence, called SiRTAs stimulate Cdc-13 and telomerase recruitment to initiate de novo telomere addition (dnTA). This heals chromosomes at the expense of terminal sequences. The Friedman Lab recently demonstrated that loss of the deubiquitinase Ubp10 reduces dnTA while increasing translocations at SiRTAs. A known Ubp10 target, PCNA, is a DNA sliding clamp whose ubiquitination directs DNA damage tolerance pathways. Deletion of the E3 ligase Rad18, which prevents PCNA ubiquitination, suppresses translocations in *ubp10Δ* cells, implicating PCNA. Because mono-ubiquitylated PCNA recruits translesion synthesis (TLS) polymerases, we examined whether TLS contributes to translocation formation. Using *Saccharomyces cerevisiae* strains lacking Rad30 or Rev1 in *ubp10Δ* backgrounds, we analyzed repair outcomes to distinguish TLS from template switching mechanisms.

This experience was funded by Trustee Endowed Internship Fund

Poster #54

Title: *What on Earth is ALAN?: DarkSky International and the fight against light pollution*

Presenter(s): Mariana De Aguiar Féo '28

Over the course of ten weeks, I contributed to several projects. I was initially tasked with developing a Sky Quality Meter Global Repository—a database to centralize global light pollution data. I also helped moderate “Capture the Dark,” DarkSky’s annual photography contest, where I helped them moderate over 2,000 submissions from several categories. I was also tasked with translating and updating advocacy documents, prompting me to practice several of my language skills, such as Arabic, Spanish, Portuguese, and English, teaching me to think critically about how messaging changes across languages and cultures. Additionally, I was responsible for creating biweekly interaction prompts and conversations in our Slack community with over 2,000 advocates, delegates, and staff members from around the world.

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

Poster #55

Title: *Modeling Access Patterns for a Shared GPU*

Presenter(s): Theo Demetriades '26

Other Authors/Contributors: TTanya Amert (Assistant Professor of Computer Science, Carleton College), Rebecca Moran '27

Supervisors and Institutional Affiliations: Tanya Amert (Assistant Professor of Computer Science, Carleton College)

Graphical processing units (GPUs), originally used for rendering computer graphics, are now a crucial resource for AI, robotics, and really all of “real-time” computing. For safety-critical systems, we need to understand how these applications use the GPU. In this project, we sought to formulate a method for classifying access patterns by their distribution (instead of just durations). We propose such a method, along with a collection of classes, in the hopes that this will allow future work to make better assumptions about program parameters before analysis is begun. Additionally, we provide new details about the behavior of NVIDIA’s CUDA Graph API, which is a relatively new feature being widely used in some of the most popular machine learning libraries (e.g. Tensorflow), and describe how Graphs can be incorporated into our classification scheme.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #56

Title: *Summer 2025 Internship at Regnos (Tech Startup)*

Presenter(s): Devin Dennis '26

During the summer 2025, I completed a software engineering internship at Regnos, a tech startup, where I developed backend systems for getHOAdocs, a platform designed to streamline HOA document acquisition for homebuyers. My primary responsibilities included building Python-based backend infrastructure, developing web scraping capabilities to extract HOA document data from various websites, and creating an AI search agent to identify and collect contact information from HOA companies. A significant portion of my work involved data analysis and cleaning to enhance contact information quality and improve the platform's user connection capabilities. This experience provided hands-on exposure to Large Language Model (LLM) agents for specialized tasks and deepened my understanding of AI applications in real-world business contexts. The internship confirmed my interest in software engineering, particularly in AI and machine learning applications, while teaching me valuable lessons about collaboration in smaller development teams and individual responsibility in major coding projects.

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

Poster #57

Title: *Laura Baker Services Association Public Policy Intern*

Presenter(s): Clara Devey '27

During my public policy internship at Laura Baker Services Association this summer, I had the opportunity to engage directly with the disability community by interviewing advocates and writing articles that shared their powerful stories. My goal was to inspire others to become active participants in advocacy and to raise awareness about the importance of inclusion and support for individuals with intellectual and developmental disabilities. In addition to storytelling, I utilized platforms like VoterVoice and social media to disseminate advocacy content in impactful and strategic ways, helping to amplify the voices of those often underrepresented. This experience deepened my understanding of public policy, advocacy, and the role of communication in driving social change.

This experience was funded by Jean Philips Memorial Internship Fund

Poster #58

Title: *Chicago Rat Project*

Presenter(s): Charles Dickey '26

Chicago has been recognized as the rattiest city in the world for over a decade, such close proximity to rats in the city presents high risk to people and pets. Of the most common zoonotic diseases rats carry, Bartonella is one of the most severe. Environmental data and rat sample testing reveals that urban heat and environmental lead contamination are correlated to increases in Bartonella infections in Chicago's rats.

This experience was funded by Elizabeth K. Ester '79 and Michael T. Brody Endowed Internship Fund

Poster #59

Title: *Environmental Policy and Advocacy Internship at Sheep Mountain Alliance*

Presenter(s): Ruby Dirks '26

As an environmental policy and advocacy intern, I primarily worked on community outreach, public commenting, and event planning. Through small-scale research projects, I was able to dive deeper into pressing environmental policy concerns such as the possible sale of U.S. public lands and the threats raised by increasing local forest mortality due to bark beetles and drought. This research directly informed public comments from the organization that, in turn, informed policy decisions at the local and state levels. By participating in community conversations and eventually facilitating one myself, I learned more about local environmental issues that community members care deeply about and the many ways in which they remediate feelings of helplessness by coming together to discuss their aspirations for the futures of the ecosystems surrounding Telluride.

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

Poster #61

Title: *Raising Minnesota Wildlife*

Presenter(s): Guinevere Dunn '28

During my summer internship at the Wildlife Rehabilitation Center of Minnesota, I gained hands-on experience in the care and treatment of several mammal species native to Minnesota. Working in the mammal nursery, I assisted in feeding, medical assessment, and rehabilitation of injured or orphaned juveniles. I learned critical skills such as administering subcutaneous fluids and tube feeding, while contributing to daily sanitation tasks to ensure a clean environment for our patients. This immersive

experience deepened my passion for wildlife conservation and strengthened my ability to collaborate in a team-oriented setting.

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

Poster #60

Title: *Isolating the Subunits of Calpain-7 to Determine Novel Substrates and Interactors*

Presenter(s): Avery Dunn '26

Supervisors and Institutional Affiliations: Katie Munro (University of Utah), Elliott Paine (University of Utah), Wesley I. Sundquist (Professor of Biochemistry, University of Utah)

Calpain-7 (CAPN7), a member of the calpains family, is a calcium-dependent cysteine protease expressed in mammalian cells. Previous studies identified CAPN7 as a cofactor in the ESCRT-III pathway, which is a critical mediator of the membrane fission step. CAPN7 is recruited to the midbody by the ESCRT-III protein IST1, where it is essential towards efficient abscission and NoCut checkpoint maintenance. However, while binding partners of CAPN7 have been identified, its proteolytic substrate(s) remain unknown. In this project, we sought to determine the novel substrates of CAPN7 by individually expressing its component subunits. To identify potential binding partners, the CAPN7 subunits were cloned in pLVX vectors along with a TurboID-GFP construct, which allowed for identification of candidate substrates through the use of enzyme-catalyzed proximity-labeling. We successfully isolated clones for the CAPN7 domains, with future studies seeking to express the relevant proteins and determine potential binding partners of each component subunit.

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

Poster #62

Title: *Advancing Access to Justice: Social Justice Internship at the Binger Center for New Americans*

Presenter(s): Mariana Duran Amaya '27, Rosemary Zhao '27

Through a Social Justice Internship at the University of Minnesota Law School's Binger Center for New Americans, we engaged in immigration law, advocacy, and community outreach. Our work included supporting citizenship recognition cases, providing interpretation and translation for clients, and assisting attorneys with case preparation. We participated in pro bono consultations at the Kandiyohi Detention Center and collaborated with the Immigrant Defense Network to develop outreach strategies for rural immigrant communities. This internship not only advanced the Binger Center's mission of expanding access to justice but also provided us with valuable professional and personal growth in law, advocacy, and social justice work.

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

Poster #63

Title: *Evaluating Outcomes Of A Perioperative Nutrition Program For Head And Neck Cancer Surgery Patients: A Retrospective Analysis*

Presenter(s): Amir Etemadi '27

This study evaluates the impact of a nursing-led preoperative nutritional screening and referral program for patients undergoing curative surgery for oral cavity cancer (OCC) at a tertiary care center between 2018 and 2024. The intervention, introduced in December 2024, utilized the Patient-Generated Subjective Global Assessment (PG-SGA) to identify patients at nutritional risk. Those scoring ≥ 4 were referred for formal nutritional consultation. Researchers compared outcomes from patients treated six months before and after the program's implementation, focusing on demographics, tumor characteristics, and postoperative metrics. Among 73 patients reviewed, baseline characteristics were comparable between pre- and post-intervention groups. Post-intervention, 78.9% of patients received PG-SGA screening, with 70% requiring nutritional intervention and nearly half in critical need. Nutrition consult orders and completions significantly increased without delaying surgery. Notably, median postoperative BMI loss was reduced from 0.93 to 0.45, though complication rates remained unchanged. The findings underscore the importance of routine nutritional screening in multidisciplinary OCC care, with nursing-led initiatives proving effective in identifying and addressing malnutrition risk. Further refinement of this approach may enhance perioperative outcomes.

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

Poster #64

Title: *Exploring the Effects of hurricanes on Coral Stability using Flow-Kick Models*

Presenter(s): Jasmin Fallin '28, Agnes Boahen '28, Lenn Kong '26

Other Authors/Contributors: Kate Meyer (Assistant Professor of Mathematics, Carleton College)

Supervisors and Institutional Affiliations: Kate Meyer (Assistant Professor of Mathematics, Carleton College)

The long-term effects of hurricanes on both the populations of coral and macroalgae can be modeled by Flow-Kick modeling. Flow-kick models describe the growth and behavior of an Ordinary Differential

Equation system with respect to time, and then an instantaneous disturbance ('kick'). With this, we can manipulate various parameters such as time and growth rates to examine the behavior of such systems under stress or disturbance. In our case, we used the equations from Blackwood et al. (2011) and examined the behavior of this coral-macroalgae system while also introducing deterministic hurricanes. With our 3D simplified model that captures time, coral, and macroalgae, we found that frequent hurricanes will benefit the population of coral under certain parameters.

This experience was funded by NSF Grant - Launching Early-Career Academic Pathways in the Mathematical and Physical Sciences

Poster #65

Title: *Corporate Finance at Thomson Reuters*

Presenter(s): Sivan Faruqui '26

I worked for the corporate finance division of Thomson Reuters, a global legal and tax technologies company. I supported an internal strategy team with daily ad-hoc projects including data cleaning, data analysis, and data visualization. I also had three internship-long projects, which I presented to 250+ finance professionals at the company.

This experience was funded by Solhem Business Fellowship Fund

Poster #66

Title: *Investigating the Evolution of Milky Way-like Galaxies Using the Metallicity of Accreted Stars*

Presenter(s): Mary Precious Feutsop Ngouane '27

Other Authors/Contributors: Andreia Carrillo (Assistant Professor of Physics, Carleton College)

Supervisors and Institutional Affiliations: Andreia Carrillo (Assistant Professor of Physics, Carleton College)

Understanding how galaxies assemble requires understanding how their building blocks have formed. In particular, the radial metallicity gradients of dwarf galaxies provide key insights into their star formation and enrichment histories, as well as how these signatures are altered once they are accreted into a larger system like the Milky Way. In this study, we analyze the metallicity gradients of disrupted satellite galaxies using the Auriga suite of cosmological magnetohydrodynamic simulations. We focus on two

Milky Way–like halos, examining 39 fully accreted satellites with stellar masses between 106 to 109 solar masses. At the time of infall, nearly all progenitors exhibit negative metallicity gradients, with steeper slopes in lower-mass systems. As these galaxies are tidally disrupted and their stars become part of the Milky Way halo, the gradients flatten significantly. By the present day, most low-mass progenitors show nearly flat profiles, while the most massive ones retain modestly negative gradients. These results suggest the existence of a stellar mass threshold—around $10^{8.2}$ solar masses—above which remnants preserve a measurable imprint of their original metallicity structure, and below which this information is essentially erased. This finding has important implications for interpreting the fossil record of accretion in the Milky Way halo and motivates expanding the analysis to a larger statistical sample of simulated and observed systems.

Poster #67

Title: *Aminoacyl-tRNA Synthetases from a Fish Tapeworm*

Presenter(s): Julian Flanagan '26

Other Authors/Contributors: Joe Chihade (Professor of Chemistry, Carleton College)

Supervisors and Institutional Affiliations: Joe Chihade (Professor of Chemistry, Carleton College)

Helminths, a broad group of parasitic worms, are responsible for a significant global disease burden. Despite their prevalence, few drugs exist to treat these chronic and disabling infections. Aminoacyl-tRNA synthetases (ARS), a group of enzymes essential for protein synthesis, are possible drug targets. To assess the drug target potential of helminth ARS, we study enzymes from *Schistocephalus solidus*, a fish tapeworm closely related to human parasites. We have extracted protein-coding sequences for four *S. solidus* ARS from tissue samples. Our ongoing work aims to express and purify these enzymes in order to characterize their aminoacylation activity.

Poster #68

Title: *International Sales at Infopro Digital*

Presenter(s): Bridget Foley '27

This past summer, I had the amazing opportunity to intern with the International Sales team at Infopro Digital Média Paris. In this role, I gained experience prospecting and managing relations with a global client base in the B2B media world. Conducting most communications in French allowed me to strengthen my language skills daily. In addition, I helped our team facilitate this year's B2B Summit at the Parc de Princes Stadium.

This experience was funded by Abeona Endowed Fund for International Internships

Poster #69

Title: *Working as a Public Defender*

Presenter(s): Roland Foster '28

Other Authors/Contributors: Lola Taraday '26

I worked for the Hennepin County Public Defenders Office as an Intern, for two months during the summer. My role primarily consisted of assisting lawyers and law clerks with various tasks, ranging from data management to evidence review.

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

Poster #70

Title: *Sexual experience alters the rewarding effects of morphine and amphetamine in female Long-Evans rats*

Presenter(s): Margaret Frost '27, Kathryn Kresse '26

Other Authors/Contributors: Hanni Zhu '25, Colin K. James '25, Tyler R. Beasley (Educational Associate in Neuroscience, Carleton College), Sarah Meerts (Program Director of Neuroscience, Professor of Neuroscience and Psychology, Carleton College)

Supervisors and Institutional Affiliations: Sarah Meerts (Program Director of Neuroscience, Professor of Neuroscience and Psychology, Carleton College)

The rewarding effects of mating in female rats are enhanced through sexual experience. We hypothesize that behavioral differences in experienced versus naïve rats reflect alterations in opioid and dopamine systems, causing differential sensitivity to morphine and amphetamine-induced reward. The conditioned object paradigm assessed whether experienced and naïve rats display differences in reward induced by morphine or amphetamine. In Experiment 1, rats received saline or 0.5, 1, or 2 mg/kg morphine. Naïve rats exhibited a conditioned object preference (COP) across doses of morphine, whereas experienced rats exhibited a COP only for 2 mg/kg morphine. In Experiment 2, rats received saline or 0.5 or 1 mg/kg amphetamine. Naïve rats showed a COP for all doses of amphetamine, whereas experienced rats exhibited a COP for 0.5 mg/kg treatment. These data indicate that sexual experience alters the rewarding effects of opioid and dopamine drugs in female rats.

Poster #71

Title: *Orthopedic Research Internship at Children's Hospital Colorado*

Presenter(s): Brynn Gaebe '26

I interned in the Musculoskeletal Research Center at Children's Hospital Colorado in Denver, Colorado. My research centered on the rates of nephrolithiasis and nephrocalcinosis in pediatric patients with Osteogenesis Imperfecta (OI). Patients with OI have been anecdotally reported to have higher rates of both nephrolithiasis and nephrocalcinosis but no studies have proved this link or looked into possible correlations between OI severity and the development of kidney problems.

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

Poster #72

Title: *Rewriting England: Early Gothic Literature and Catholicism*

Presenter(s): Ambar Galaviz Navarrete '26

Other Authors/Contributors: Adriana Estill (Professor of English and M.A. Hulings Professor of American Studies, Carleton College), Cherlon Ussery (Professor of Linguistics, Carleton College), Marynel Ryan Van Zee (Director of Student Fellowships, Lecturer in History, Carleton Coll

This poster illustrates the historical significance of sites related to Gothic literature. Among the five sites that I visited during July 2025, two stood out: Strawberry Hill House and Hardwick Hall. Strawberry Hill House witnessed the birth of Gothic Literature when Horace Walpole wrote *The Castle Of Otranto* in 1764. Hardwick Hall, built in 1590 by Bess of Hardwick, went on to inspire both Ann Radcliffe, the most prominent Gothic author and Walpole. Both of these places were decorated using antiquities from English monasteries that were confiscated during the Dissolution of Monasteries (1536- 1540). Despite their Catholic English influence, Early Gothic novels are usually set in Catholic Continental Europe, and criticized these societies for their fomentation of corruption, greed, and violence. Examining the relationship between Gothic novels and Catholicism I argue that these novels served to shift the understanding of Catholicism to distance England from its past religion.

This experience was funded by Kelley International Fellowship

Poster #73

Title: *Ligand Enabled Enantioselective α -Hydroarylation of Vinylheteroarenes*

Presenter(s): Yinan Gao '26

Supervisors and Institutional Affiliations: Shenghua Yang, Keary Engle

Heteroarenes are essential building blocks in bioactive molecules and drug developments. Herein, we report an enantioselective α -hydroarylation reaction of vinyl heteroarenes enabled by palladium catalysis and innovative ligand design. This reaction tolerates a broad substrate scope, including almost all common heteroarenes. In all cases, the dihydrogenation byproduct is well suppressed.

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

Poster #74

Title: *Craft Brewing Internship in Niyodogawa, Japan*

Presenter(s): Benjamin Garcia '26

This experience was a 6 week summer internship at Mukai Craft Brewing in Niyodogawa, Japan. MCB is a mom-and-pop brewery in the mountains of Southern Japan which specializes in small-batch brews which utilize the pristine mountain water and local ingredients. MCB's mission as a business is to champion sustainability and footprint reduction, as well as to push for rural revitalization in the face of depopulation in Niyodogawa.

This experience was funded by Abeona Endowed Fund for International Internships

Poster #75

Title: *"Pues nos usaron. Regalamos nuestros mejores años": A Sociological Study of Aging in Older Latin-American Immigrants in the US*

Presenter(s): Juan Garcia Reyes '26

Other Authors/Contributors: Annette Nierobisz (Ada M. Harrison Distinguished Teaching Professor of the Social Sciences, Professor of Sociology, Carleton College)

Supervisors and Institutional Affiliations: Annette Nierobisz (Ada M. Harrison Distinguished Teaching Professor of the Social Sciences, Professor of Sociology, Carleton College)

The public and academic discourse on immigration focuses on young and working age immigrants at the expense of those exiting the workforce. Think about the labels that immigrants are assigned:

“Dreamers”, “criminals”, “[undocumented] workers”. Do any of those evoke images of someone with gray hairs and wrinkles? What space is there for those who have been worked past the bone? This study presents the findings from 11 interviews (7 from Minnesota and 4 from Georgia) conducted in the summer of 2025 of older Latin-American immigrants and their experiences and expectations of aging and retirement. From those 11 interviews, 3 main themes were identified: 1.) retirement is synonymous with incapacitation - the plan for everyone was to work until they couldn't; 2.) there is a greater reliance on informal support networks than formal ones; 3.) living paycheck to paycheck and with uncertain legal status makes it difficult, if not impossible, to plan for the future.

This experience was funded by Mellon Mays Undergraduate Fellowship

Poster #76

Title: *Administration and Community Engagement Intern at Prison Pet Partnership*

Presenter(s): Lillie Geil '26

This past summer, I had the opportunity to work as an administrative and community engagement intern with Prison Pet Partnership (PPP) in Washington State. PPP is the world's first prison pet program, and focuses on providing incarcerated women with vocational pet care and training skills. The women learn to board, groom, and train shelter dogs, many of which become service animals. PPP relies upon volunteer support to move animals around the prison and interact with boarding and grooming customers. As an intern, I coordinated the volunteer onboarding process, communicating with applicants to gauge continued interest and facilitate next steps. Additionally, I increased communication between PPP and its volunteers by beginning a weekly volunteer newsletter that contained important updates and advertised the number of available shifts for the week.

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

Poster #77

Title: *Mapping the World: Nuremberg to Northfield*

Presenter(s): Riley Gibson '26

Other Authors/Contributors: Victoria Morse (Chair of History, Program Director of Medieval and Renaissance Studies, Professor of History, Carleton College)

Supervisors and Institutional Affiliations: Victoria Morse (Chair of History, Program Director of Medieval and Renaissance Studies, Professor of History, Carleton College)

This summer I did research on some of the Charles Frederick Schlaberg and Thomas L. Hughes collection of maps, primarily those made by the Homann firm. The maps are originals held in Carleton's Special

Collections and are excellent examples of the quality of maps being produced in Germany in this period and the map industry's responses to different cultural demands.

I also worked on making the Mapping the World website a more useful resource for researchers by providing new contributions, improving the item tagging, and editing. The site is a digital archive of the maps in Carleton's Special Collections, intended to add on to the information provided by the Library Catalogue. Initially created in 2018, the site has been added to over the years by Professor Victoria Morse and undergraduate students.

This experience was funded by Trustee Humanities Endowed Student Research Fund

Poster #78

Title: *GROWTH AND REFLECTION THROUGH SERVICE ABROAD*

Presenter(s): Christine Gichimu '26

My internship took place at a center dedicated to providing holistic support for displaced individuals and families. The organization's mission is to create a safe, welcoming environment where people can access essential services while regaining a sense of dignity and normalcy. I especially valued the personal nature of the work, as direct contact with guests allowed me to build meaningful connections and witness the impact of our efforts. I rotated across three major spaces. First, the women's area, where I supported self-care and creative activities; then Parea Club, a recreational space fostering play, conversation, and cultural exchange; and The Nest, a children's space offering structured play and stability. These environments promoted healing, joy, and community. A key aspect of my internship was training as a Psychological First Aid Responder, which equipped me to recognize distress, de-escalate situations, and connect individuals with resources, ensuring guests felt safe, respected, and supported.

This experience was funded by Multicultural Alumni Network (MCAN) Fellows Program

Poster #79

Title: *Impacts of Shared Identity and Experience on Felt Understanding*

Presenter(s): Khava Gillespie '27, Daniel O'Connor '28

Other Authors/Contributors: Emma McGorray (Assistant Professor of Psychology, Carleton College), Elsie Newburg '27, Daniel O'Connor '28

Supervisors and Institutional Affiliations: Emma McGorray (Assistant Professor of Psychology, Carleton College)

Previous research has suggested that individuals experiencing minority stress feel more understood by support providers who share the support recipient's identity, and that this effect applies if the support recipient perceives that the support provider shares their identity, even if this is not actually the case. We conducted two studies to determine if sharing a similar experience related to sexual minority stress would also increase understanding, and if sharing a different, unshared marginalized identity would increase understanding in the absence of a shared sexual minority identity. In each study, participants read a fabricated support exchange across different conditions and rated the level of understanding of the support provider. We found that both shared identity and similar experience had a significant effect on understanding, and that among support providers who did not share the support seeker's queer identity, having a different marginalized identity was associated with greater perceived understanding.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #80

Title: *My Summer Internship: Publishing Scientific Papers and Presenting at an International Conference*

Presenter(s): David Gimelfarb '27

Supervisors and Institutional Affiliations: Alfonso Tafur (Endeavor Health)

Over the summer, I worked with Dr. Tafur of Endeavor Health on several research projects. The main one we worked on together was a paper on the implementation of a direct oral anticoagulant interruption protocol. I created a poster presentation for this paper, and then submitted it to be presented at the International Society of Thrombosis and Haemostasis Congress in June of 2025. I traveled to the ISTH Congress in Washington, DC, and gave the poster presentation in front of numerous medical professionals. In addition to this, I also worked on a case report paper on a person suffering from KTS and a sciatic vein. My poster presentation will discuss these research projects, as well as the efforts I took in order to get them released.

This experience was funded by Elizabeth K. Ester '79 and Michael T. Brody Endowed Internship Fund

Poster #81

Title: *Progress Towards More Efficient Catalysis at Co=Si Bonds*

Presenter(s): Kiana Giuliani '27

Other Authors/Contributors: Matt Whited (Chair of Chemistry, Professor of Chemistry, Carleton College)

Supervisors and Institutional Affiliations: Matt Whited (Chair of Chemistry, Professor of Chemistry, Carleton College)

Metal silylenes (M=Si) can access unique reactivity when stabilized within a pincer-type PSiP ligand framework. Previous research in the Whited group has shown that such complexes can serve as catalysts for isocyanate formation from organic azides and carbon monoxide. However, the substrate scope has been limited and catalytic yields uneven. This poster focuses on refining the catalytic procedure with the pincer-type cobalt silylene catalysts featuring relatively unencumbered isopropyl phosphine substituents. We address issues previously encountered and show that highly efficient catalysis exceeding previous results can be achieved through proper control of conditions.

This experience was funded by RUI: CAS-SC: Promoting Group-Transfer Reactions at Metal/Main-Group Bonds

Poster #82

Title: *Gut Bacteria Diversity Predicts Bib Feather Brightness in Common Yellowthroats*

Presenter(s): Maxima Gomez-Palmer '26

The Common Yellowthroat is a warbler, breeding throughout the U.S. It has a black “mask” and yellow throat “bib. Carotenoids are pigments produced by plants. They are essential for plumage coloration in birds, but birds cannot make carotenoids themselves; they acquire them through eating insects. Internally, carotenoids protect against DNA damage caused by oxidative stress. Externally, they enhance yellow plumage coloration, aiding in sexual signaling. Brighter yellow plumage is an honest signal of reproductive success and survivorship. Some avian gut bacteria produce carotenoids as well. Studies suggest bacteria-produced carotenoids may affect carotenoid-based plumage, such as yellow bibs. I explored correlations between gut microbiome composition, bib size & reflectance, and mask size in Common Yellowthroats.

Poster #83

Title: *Phylogenetic Insights into Nutrient Limitation: Mapping the History of Iron, Nitrogen, and Phosphorus Scavenging in Microbes*

Presenter(s): Adrián González '26

Other Authors/Contributors: Rika Anderson (Associate Department Chair of Biology, Associate Professor of Biology, Carleton College)

Supervisors and Institutional Affiliations: Rika Anderson (Associate Department Chair of Biology, Associate Professor of Biology, Carleton College)

Primary production, and thus the extent of the biosphere, depends on the availability of key nutrients such as iron, nitrogen, and phosphorus (Redfield, 1934; Tyrrell, 1999; Elser et al., 2007; Planavsky et al., 2014). While geological models can estimate nutrient fluxes through Earth history, it is more difficult to determine which elements were biologically limiting (Reinhard et al., 2017; Laakso & Schrag, 2018; Boden et al., 2024). To address this, we reconstructed the evolutionary history of nutrient scavenging genes as a proxy for nutrient limitation over time. Genes involved in iron, nitrogen, and phosphorus scavenging were statistically identified as well as through a literature search, grouped by substrate, and mapped across bacterial and archaeal lineages to track duplications, losses, and horizontal transfers (Merchant & Helmann, 2012; Ustick et al., 2021; Sharpe et al., 2023).

This experience was funded by NASA Astrobiology Program Grant No. 80NSSC18K0829

Poster #84

Title: *Summer at the Massachusetts State House*

Presenter(s): Olivia Gottlieb '28

As a legislative intern, I learned how to communicate with constituents, write press releases and remarks for local events, and prepare testimony and bill summaries for hearings and caucus meetings. I also conducted a capstone project on racial imbalances in schools in my district, using data released by the state to demonstrate academic disparities and offer recommendations on how integration methods such as magnet schools and busing programs can become more effective. Through analyzing performance on Massachusetts standardized test MCAS, I find that students attending segregated white schools in my district score almost 30 points higher on average than students attending segregated nonwhite schools in my district. Through interviews with experts, I find that matching funding for integration program METCO with overall Chapter 70 state education aid could help alleviate the negative consequences of school segregation.

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #85

Title: *Controlled Protein Unfolding Using Ion Mobility*

Presenter(s): Rilke Grimlund '26

Other Authors/Contributors: Matthew Bush (UW), Addison Roush (UW), Bruce Feng (UW), AnneClaire Wagemen (UW)

Most high-performance mass spectrometry workflows include tandem mass spectrometry, which uses ion selection and activation to increase selectivity. Tandem Native Ion Mobility Mass Spectrometry (IM-MS) allows for experimental determination of size and shape of proteins, as well as separation based on these characteristics. The traveling wave Structures for Lossless Ion Manipulations (TW SLIM) architecture facilitates this while also allowing for control over the different electrodes and regions of the device. The Bush lab's new IM-MS instrument combines the standard architecture with a new method for collision-induced unfolding of proteins, Conformational Landscapes Observed through Controlled Kinetics (CLOCK). CLOCK was first demonstrated by use of DC potential to modulate the effective temperature of ions. I used ion trajectory simulations to test a series of hypotheses that other RF and DC potentials could also be used to further modulate the effective temperature and compared the results.

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

Poster #86

Title: *Exploring the Developmental Relationship Between BND1 and BND2 cells as it Relates to T1D*

Presenter(s): Alexander Grosse '26

Research Assistant at the Smith Lab, which operates within the Barbara Davis Center for Diabetes. My research focused on elucidating the developmental pathway of BND2 B cells, which are potentially pathogenic cells in the onset of type 1 diabetes. I conducted in vivo and in vitro experiments using mouse models, as well as in vitro studies with human samples. As part of my research, I also used flow cytometry to quantify and analyze cell populations.

Poster #87

Title: *Royal Structures, Macedonian Kings, Magical Objects, and Identity in Ancient Northern Greece*

Presenter(s): Aselya Gullickson '26, Sophia Ying '26

This poster shares the results of a joint two-week research trip to Thessaloniki, Greece, where we each undertook a project examining the intersection of myth and identity at the Hellenistic archaeological

sites and museums. Aselya's project explored how magical objects—amulets, curse tablets, and artwork—shaped individual and communal religious identities. Sophia's project investigated how Macedonian rulers constructed royal identity by drawing upon mythological precedents, particularly in palace architecture, tombs, and administrative sites. This trip provided firsthand engagement with archaeological sites, museum collections, and scholars in the field, enabling us to apply methodologies learned in coursework and fieldwork. Our research will contribute to our Classics comps and Sophia submitted two peer-reviewed articles for publication. This fellowship experience has deepened our understanding of ancient identities and ruling structures while refining our methodological approaches to ancient material culture.

This experience was funded by CRGS Fellowship

Poster #88

Title: *Museum at Dinosaur Junction*

Presenter(s): Bensen Han '27

My experience up in the Rocky Mountains as an intern for a local dinosaur museum. I have tours on the local geology and paleontology, Made activity booklets for young children, and handled reptiles

This experience was funded by Class of 1970 Endowed Internship Fund

Poster #89

Title: *Building Connections Across Borders*

Presenter(s): Trinity Hanif '26

This past summer, I volunteered at Europecares, a nonprofit in Lesvos, Greece. The goal of this organization is to provide community, dignity, and support for displaced populations. Our work was housed at a local community center called Parea, which is located near the camp housing asylum seekers. I worked in multiple spaces. I prepared drinks and assisted with lunch service in the Cafe, organized craft and self-care activities in the Women's Space, and taught basketball and played board games at Parea Club.

This experience was funded by Multicultural Alumni Network (MCAN) Fellows Program

Poster #90

Title: *Neurointervention for Intracranial Atherosclerotic Disease*

Presenter(s): Arthur Hanson '26

Intracranial atherosclerotic disease (ICAD) accounts for a significant proportion of ischemic strokes but remains a therapeutic challenge. ICAD is primarily treated with medical management, which consists of dual antiplatelet therapy and risk factor control. When patients fail medical management, they may be considered for endovascular interventions, including angioplasty and stenting. However, these interventions carry significant risks. The landmark SAMMPRIS trial, which compared stenting with medical management, found a much lower recurrent ischemic event rate in patients treated with medical management. Despite both refined stenting protocols and new stent devices introduced in later trials, stenting for ICAD remains much higher risk than medical management. In order to eliminate this risk, the next generation of ICAD stents is desperately needed. This next generation of ICAD stents will ideally be thinner, drug-eluting, and have a hybrid cell design to improve outcomes for these high-risk patients.

Poster #91

Title: *CLM Ventures Internship Experience*

Presenter(s): Alden Harcourt '27

Other Authors/Contributors: Axel Olson '28, Vivek Manchala '28, Clay Haddock '24, Michael Dreger '23

While I gained valuable technical knowledge, the most important skill I honed was translating complex business processes for different audiences. I applied this skill in many forms, from codifying underwriting logic for the AI agent and explaining our investment strategy to fellow interns, to pitching a new lender servicing startup to potential customers in Washington. I realized that the act of communicating an idea concisely and effectively is the ultimate test of one's own understanding. Being trusted with meaningful analysis and communication affirmed my passion for the intellectual rigor of not just understanding a complex system, but making it accessible to others.

This experience was funded by Welsh Family Endowed Fund for Internships in High Growth Industries

Poster #92

Title: *My Time as a Judicial Intern at the Bronx Criminal Court*

Presenter(s): Oscar Hayes '28

This summer, I worked at the Bronx Criminal Court as a Judicial Intern for the Honorable Judge Ralph Wolf. At the court, I was responsible for drafting memos, editing decisions that were then published, and helping with anything else the judge may need. I also spent many hours simply observing the daily proceedings of the court and building connections with different people who worked in the court along the way. I was even lucky enough to meet Chief Judge Wilson of the NYS Court of Appeals, the highest court in New York State.

This experience was funded by The Endowed Internship Fund for Public Service.

Poster #93

Title: *Analysis of Outcomes of Gillette Rehabilitation Therapies as Measured by the COPM Change Score*

Presenter(s): Zoe Heart '26

The Canadian Occupational Performance Measure (COPM) is a progress assessment used by rehabilitation therapists that emphasizes self-assessment; patients identify their own rehabilitative goals and self-rate their progress towards those goals throughout their episode of care. At Gillette Children's Hospital and Clinics, the efficacy of this assessment between 2019-2026 was explored through analysis of electronic medical records, staff surveys, and clinical observation. Data analysis of EMR showed that the majority of patients in rehabilitation therapies at Gillette have made clinically significant progress according to the COPM. However, data also showed that only ~20% of COPMs are fully completed in Gillette Rehabilitation Clinics. Comments from staff and observers revealed significant barriers to completing the assessment, particularly in cases where patients' preferred language was not English. More investigation is warranted regarding strategies to increase the efficiency of the COPM, particularly across Gillette's diverse patient population.

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

Poster #94

Title: *In Vitro Selection of DNAzymes for Protein Lysine Acylation*

Presenter(s): Eleanor Hebard '26

Supervisors and Institutional Affiliations: Scott K. Silverman (Professor of Chemistry, University of Illinois Urbana-Champaign)

DNA, while normally thought of as the 'genetic code' that is translated into proteins necessary for life, can actually have many different functions both within and outside of biological systems. For instance, single-stranded DNA can have catalytic properties, speeding up difficult chemical reactions through interaction with substrates. These single-stranded DNA sequences are referred to as DNAzymes. This research centers on the de novo discovery of DNAzymes capable of catalyzing protein lysine acylation through in vitro selection, an iterative process by which catalytic sequences emerge from a random DNA pool through enrichment and amplification. This work builds upon previous research identifying DNAzymes for peptide lysine acylation. Discovery and future characterization of DNAzymes for protein lysine acylation will have important implications for the growing field of protein modification.

Poster #95

Title: *Arb Exhibit Project Manager*

Presenter(s): Perry Hefferren-Harkless '27

Other Authors/Contributors: Sinda Nichols (Director of the Centr for Community and Civic Engagement, Carleton College), Nancy Braker (Puzak Family Director of the Cowling Arboretum, Senior Lecturer in Biology, Carleton College), David Bliss (Digital Archivist and Librarian, Carleton)

For my internship, I was tasked with creating an exhibit for the centennial anniversary of Carleton's Arboretum. I focused on how the Arb has brought together the town and the college. My boss and I met with Sinda Nichols and Nancy Braker to come up with a plan. We decided the exhibit will consist of different informational boards about the Arb's history being put up in different locations around town. My final product was a board about education and the Arb to be placed in the YMCA as well as a guide for future work on this project.

This experience was funded by Project '60 Endowed Internship Fund

Poster #96

Title: *Engineering Salmonella for Localized Endostatin Delivery*

Presenter(s): Katie Hess '26

This summer I worked in the Saltzman Lab at the University of Minnesota, which develops virulence-attenuated *Salmonella typhimurium* as a platform for tumor-targeted cancer therapy. My primary project focused on engineering *Salmonella* to secrete endostatin, a potent inhibitor of angiogenesis that blocks vascular endothelial growth factor receptor-2 (VEGFR2) on endothelial cells, starving tumors of their blood supply. I assisted in constructing and verifying plasmid systems for endostatin secretion using molecular cloning techniques, including gBlock preparation, restriction digest, ligation, electroporation, and Sanger sequencing. I also cultured CT26 colon carcinoma cells, genotyped mice and set up breeders, and gained experience with murine cancer models through observing retroorbital injections and assisting in bioluminescence imaging to monitor bacterial tumor colonization. This internship strengthened my experimental problem-solving and translational research skills while highlighting the promise of bacterial immunotherapy for cancer and informing my future plans for medical school and physician-scientist training.

This experience was funded by Pommerenke Endowed Internship Fund

Poster #97

Title: *Immunofluorescence Reveals Antibodies Derived from Patient Tumor-Infiltrating B Cells Bind to Human and Mouse Melanoma Cells*

Presenter(s): Jordyn Hirte '27

Immune checkpoint blockade (ICB) has transformed cancer treatment, yet many patients remain resistant or nonresponsive, underscoring the need for complementary strategies. Tumor-infiltrating B cells (TIL-Bs), particularly those within tertiary lymphoid structures, correlate with improved ICB responses and produce tumor-specific antibodies. As antibody-producing immune cells, TIL-Bs recognize unique cancer antigens and represent a promising source for next-generation immunotherapies. This project examined melanoma, cloning recombinant antibodies from patient TIL-Bs, and testing their binding to human (A375) and mouse (BP) melanoma models. We cultured mouse and human melanoma cells on coverslips, fixed and permeabilized them, stained with primary and secondary antibodies, counterstained with DAPI, and imaged them using fluorescence and confocal microscopy to observe possible staining patterns. Several patient-derived antibodies produced bright immunofluorescent signals with distinct membrane, cytoplasmic, or nuclear staining patterns. These findings demonstrate that TIL-B–derived antibodies specifically recognize melanoma cells, supporting their potential as novel therapeutics. Once antigens are identified and validated, they can be used as therapeutic targets.

Poster #98

Title: *Examining Elections: Political News Coverage by Local, National, and Cable News Providers*

Presenter(s): Sonja Holtey '28, Efram Stewart '26,

Matthew Vincent '26 Joanne Chung '26, Madeleine Goldberger '28

Other Authors/Contributors: Barbara Allen (James Woodward Strong Professor of Political Science and the Liberal Arts, Carleton College), Dan Stevens (Professor of Politics, University of Exeter), Ella Hennigan '28

Supervisors and Institutional Affiliations: Barbara Allen (James Woodward Strong Professor of Political Science and the Liberal Arts, Carleton College), Dan Stevens (Professor of Politics, University of Exeter)

The ways in which people get their news in the United States have continually grown more diverse, but television remains one of the most significant platforms, and it is able to have a considerable influence on the American electorate. Our research examines television news coverage of U.S. elections during six election cycles—2000, 2004, 2008, 2016, 2020, and 2024—using a data set of over 5000 election news stories that have been analyzed as part of a multi-year project at Carleton. Students work with Professor Barbara Allen, Professor Dan Stevens of the University of Exeter (a former visiting professor at Carleton), and a number of Carleton alumni on content analysis of election coverage by national, cable and local news providers. Our summer work focused on analyzing and coding news transcripts from the 2020 and 2024 presidential election cycles and reading and compiling relevant literature for chapters of an upcoming book that will be submitted next year for publication by Springer Press.

This experience was funded by Student Research Initiatives, The Cris Roosenraad Endowed Fund for Student Research, The Ginzer Fund for Faculty/Student Collaborative Study Projects, The Laurence and Lucille Wu Family Endowed Fund for Faculty/Student Collaborative Study Projects

Poster #99

Title: *Devising Theater in the City: My Time at Chicago Children's Theater*

Presenter(s): Anne Grace Hooper '26

This past summer, I worked at Chicago Children's Theater as their design apprentice where I assisted the lead teacher during design class, making sure all projects ran smoothly, and focused on ensuring all students were involved. Not only was this a summer camp, it was also a learning experience for the apprentices where we were taught how to be teachers through the nurtured heart approach.

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

Poster #100

Title: *Financial Planning Internship*

Presenter(s): Grace Hou '27

This past spring and summer, I was an intern at The Next Level Planning Group where I was immersed in the financial planning industry. I was given tasks such as transferring client data, filing tax forms to ease the complexity for clients, submitting client deliverables to ensure areas contracted for planning were met. I was also able to complete my individual research project on financial guidance for college students and graduates and present it in front of the whole firm. From this experience, I was able to learn how to work as a team, how to communicate and ask questions, and taking extreme ownership of my work.

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

Poster #101

Title: *Enhancing Employee Experience at WTW*

Presenter(s): Nina Hsu '26

Over the summer, I had the privilege of interning with the Employee Experience (EX) team at Willis Towers Watson (WTW), a global business consulting firm that delivers data-driven solutions across three key areas: people, risk, and capital. Within the People segment, the EX team focuses on enhancing every aspect of employee experience. During my internship, I contributed to a variety of tasks that supported the team's ongoing projects. My responsibilities included researching market trends, analyzing and visualizing employee satisfaction data, and translating materials for internal and external use. In addition to daily tasks, I also completed three major projects during the internship: designing a team white paper, translating internal materials, and presenting a research project on how AI influences employee experience.

This experience was funded by Kathryn Christen Ramstad '79 Endowed Internship Fund

Poster #102

Title: *Establishing Our Career in Finance: Summer Internship at Sinolink Securities*

Presenter(s): Haochen Hu '26

During my internship with Sinolink Securities in the Fixed Income and Sales division, I focused on the analysis and monitoring of the domestic bond market, particularly asset-backed securities (ABS) issuance and investor activity. I developed VBA-based automation tools to streamline bond transaction

tracking, reducing reporting cycles from one week to one day and improving accuracy across multiple deal flows. In addition, I supported the sales team by compiling daily updates on five to six active transactions, with an average size of 50 million RMB, and by preparing weekly market reports covering interest rate movements and credit spreads.

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

Poster #103

Title: *Investigating regulators of macrophage antibody-dependent cellular phagocytosis of leukemia cells*

Presenter(s): Margaret Hu '26

Macrophages encompass a large portion of the tumor microenvironment but the factors that regulate macrophage interaction with cancer cells are poorly characterized. Antibody-dependent cellular phagocytosis (ADCP) by macrophages is a promising tumor control strategy. To identify negative regulators of ADCP, we performed a genome-scale CRISPR screen in human leukemia cells co-cultured with macrophages. We identified several gene clusters involved in MHC-I expression, a cell-surface receptor that facilitates immune recognition of self. We performed a follow-up screen to investigate whether the initial screen's top hits modulated ADCP through MHC I dependent or non-MHC I dependent mechanisms. We find that MHC I is a strong negative regulator of phagocytosis and loss of proteins responsible for peptide processing and loading MHC-I enhances ADCP. Loss of LILRB1/2, macrophage cell surface receptors that interact with MHC-I, enhances ADCP. We also identify loss of O-glycosylation genes as enhancing ADCP without affecting MHC-I expression.

This experience was funded by Trustee Endowed Internship Fund

Poster #104

Title: *A Peek into Medicinal Chemistry: My Experience Interning at a Drug Discovery Lab*

Presenter(s): Hanna Hunde '26

Throughout the summer, I worked at the Baylor College of Medicine's Center for Drug Discovery under the mentorship of Dr. Mingxing Teng and Dr. Vilas Kadam, developing skills in independent research. I performed reactions related to the Teng lab that explored the range of typical ones run in medicinal chemistry labs. Additionally, I developed skills in scientific communication by presenting my progress to other members of the lab and sharing ideas when issues arose. Overall, this experience made me more confident working in a lab and solidified that medicinal chemistry is what I want to pursue.

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

Poster #105

Title: *Bridging Finance and Climate Risk through Research*

Presenter(s): Floris Irakoze '26

During my summer internship at the African Centre for Technology Studies (ACTS), I worked as a Research Analyst examining the intersection of climate change, finance, and sustainable development. My role involved collecting and analyzing financial data from banks listed on the Nairobi Securities Exchange, applying statistical models to assess how climate risks, such as extreme weather and regulatory changes, affect the stability of the banking sector. I co-authored reports and policy briefs for investors, regulators, and policymakers, translating technical results into actionable insights. A key learning outcome was the development of the ability to communicate complex quantitative findings in clear, policy-relevant language. My contributions included a policy brief on climate-related risks to Kenya's banking sector. This experience deepened my research interest that links quantitative analysis with social and economic impact, and it reinforced my career goal of advancing sustainable finance in emerging markets.

This experience was funded by Karen Grove Feldt '61 and William A. Feldt '61 Endowed Internship Fund

Poster #106

Title: *Inhalable Micro- and Nano-Plastic Particles 1: Earliest Observations of Polystyrene in Urban and Remote Locations (2002-2014)*

Presenter(s): Maryjane Iteghete '28

Other Authors/Contributors: Maja A. Urban '27, Frankie L. Saraniti '25, and Deborah Gross (Charles "Jim" and Marjorie Kade Professor of the Sciences, Professor of Chemistry, Carleton College))

Airborne Micro- and Nano-Plastics (MNPPs), described as inhalable aerosol plastic particles, put us at risk for health concerns such as: bronchitis, lung emphysema, heart failure, and more. The earliest report documenting airborne MNPPs is in 2015 but we have aerosol chemical composition data from more than a decade prior to 2015. We wanted to know if we could identify a specific plastic type, polystyrene (PS), in ambient aerosol particles sampled prior to 2015. We focused on polystyrene because we have plentiful standard mass spectra of polystyrene latex spheres in the ATOFMS, for easy comparison to the thousands of single-particle mass spectra we have collected around the world. We separated PS particles from all the rest using machine learning algorithms. We found polystyrene in air samples earlier than ever reported and urban locations were more likely to have polystyrene than remote locations.

This experience was funded by Climate Solutions Fund of Carleton College, Summer Science Fellows Program

Poster #107

Title: *Characterizing The Vocal Circuit Anatomy of Singing Mice*

Presenter(s): JP Janik '26

Other Authors/Contributors: Joel Tripp (Visiting Assistant Professor of Neuroscience, Carleton College)

Supervisors and Institutional Affiliations: Joel Tripp (Visiting Assistant Professor of Neuroscience, Carleton College)

Social behavior is imperative for animals to communicate with one another. Identifying how social behavior circuits are mapped in the brain gives insight into how behavior is changed and regulated. Vocalization is a common way animals engage in social behavior. We conducted rabies virus tracing in Alston's singing mouse (*Scotinomys teguina*) to characterize their vocal circuits. Singing mice are small rodents that are found in Central America named for their distinctive vocalization that conveys social information. Our rabies tracing shows brain regions from the hindbrain, midbrain, and cortical regions of the singing mouse. The PVN was an identified region and it is involved in behaviors linked to vocalization such as courtship and competition. The PVN produces the nonapeptides oxytocin and vasopressin, and the hormone CRF. In addition to mapping the vocal circuits of singing mice, the neurons of the PVN that produce these products were characterized.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #108

Title: *The Sibley Group: Paleogeography and Paleoclimate of North America 1.4 Billion Years Ago*

Presenter(s): Annabel Jay '26

Supervisors and Institutional Affiliations: Nicholas Swanson-Hysell '05 (Associate Professor of Earth and Environmental Sciences, University of Minnesota)

Over the last 2 billion years, the geographic position of Laurentia, the ancient core of North America, has moved across the globe. Efforts to constrain this path involve studying the ancient magnetic fields recorded by rocks deposited at different time periods. We sampled the Sibley Group, a sequence of Mesoproterozoic sedimentary rocks in Ontario Canada, which records ancient magnetic fields effectively because of its hematite-rich red beds. Using thermal demagnetization methods, we isolated a primary magnetization component from our samples. This led us to an interpreted paleolatitude of 10.3° for Laurentia around 1.4 billion years ago, which aligns with evidence of evaporites from the field.

This experience was funded by M. Leith Shackel Internship Endowment Fund

Poster #109

Title: *Above the Table and Onto the Stage: Examining the Art of Roleplaying Games through Performance Studies*

Presenter(s): Sophia Jazaeri '27

Other Authors/Contributors: Cherlon Ussery (Professor of Linguistics, Carleton College), Andrew Carlson (Associate Professor of Theater, Chair of Theater and Dance, Carleton College)

Since it was first published in 1974, world-famous role-playing game Dungeons & Dragons (D&D) has attracted as much controversy as it has fans. The playerbase of D&D that we know today has been transformed into a diverse community of players pursuing self-exploration, expression, and fulfillment. Performance studies as a field has expanded in recent years to encompass the practice of performing gender, depth of emotion, and reflections of self. Roleplay directly addresses and transforms the relationship of a performer to audience, upending what the traditional understanding of those roles are. I argue that in roleplaying games, the audience is the artist, and must interrupt the traditional possession and agency. With the burgeoning and increasingly diverse playerbase of D&D sharing techniques with traditional performers, there is urgency for an understanding of roleplaying as a social medium of play and also as a serious, respectable performance of character and collaborative storytelling.

This experience was funded by Mellon Mays Undergraduate Fellowship

Poster #110

Title: *Software Engineering Internship at DioMedical*

Presenter(s): Yeseo Jeon '26

This summer, I worked as a Software Engineering Intern at DioMedical, a corporation that develops medical tools for both veterinary and human use. The company partners with doctors to design and distribute products for surgical procedures, covering every stage from concept to implementation. As a Computer Science major preparing for a career in veterinary medicine, this experience provided me with invaluable preparation for my future. I contributed to surgical tool inventory management, participated in meetings with colleagues and physicians to review product concepts and renders, and developed two software programs to streamline inventory management of surgical toolkits. Most importantly, I gained firsthand insight into how doctors in both veterinary and human medicine collaborate with private companies like DioMedical to design and deploy innovative medical tools.

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

Poster #111

Title: *Compensatory Pathways Driving Osimertinib Resistance in EGFR-Mutant NSCLC and Therapeutic Avenues*

Presenter(s): Anoushka Jha '29

Supervisors and Institutional Affiliations: Robert A. Kratzke (Professor of Medicine, University of Minnesota), Manish R. Patel (Associate Professor of Medicine, University of Minnesota), Ali Hammad (University of Minnesota)

Non-small cell lung cancer (NSCLC) is the leading cause of cancer-related death, and resistance to EGFR tyrosine kinase inhibitors (TKIs) remains a major barrier to sufficient responses. Osimertinib, a third-generation EGFR TKI, initially suppresses tumor growth but patients often relapse. H1975 EGFR-mutant cells were treated with sublethal doses of Osimertinib (50 nM) to generate drug-tolerant persisters (DTPs). Surviving cells were analyzed by microscopy and western blotting for EGFR signaling and stemness markers. Acute Osimertinib abolished EGFR phosphorylation, but long-term treatment produced DTPs that re-expressed P-EGFR, showed reduced ERK/AKT signaling, and activated bypass pathways such as FAK. DTPs also underwent epithelial-to-mesenchymal transition (EMT), became more invasive, and upregulated stemness markers (ALDH1A1, SOX2, OCT4). Knockdown of ADAR1 decreased stemness and increased cell death, highlighting a potential therapeutic target. These findings suggest that EMT, stemness, and bypass signaling drive osimertinib resistance, and that ADAR1 inhibition may overcome persistence in NSCLC.

Poster #112

Title: *Investigate recent crypto trends and new blockchains*

Presenter(s): Richy Jing '27

I was working closely with the Portfolio Manager to generate, research, and implement investment ideas. I was also helping develop marketing materials for events and client meetings. I was also expected to perform ad hoc duties as needed.

Poster #114

Title: *NRP2 Mediated Guidance of Vascular Sprouting*

Presenter(s): Stella Johnson '27

The lymphatic vascular system plays a critical role in tissue fluid balance, waste clearance, and immune surveillance. Neuropilin 2 (NRP2), a non-kinase co-receptor highly expressed in lymphatic vessels, has been implicated in the development and organization of lymphatic capillaries, but its precise role

remains unclear. During my internship at the Paris Cardiovascular Research Center, I assisted in experiments testing whether NRP2 is essential for efficient lymphatic drainage. Using an ear injection model in mice, lymphatic drainage was assessed by tracking dye drainage over time. This work lays the foundation for future studies comparing wild-type and NRP2-deficient mice to directly evaluate NRP2's role in lymphatic function. Beyond contributing to ongoing lymphatic vascular research, this internship provided me with valuable training in experimental methods, scientific communication, and cross-cultural collaboration.

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

Poster #113

Title: *Integrating Critical Pedagogy into Undergraduate Software Design*

Presenter(s): Aiden Johnson '27

Other Authors/Contributors: Aurelia Peterson Rajalingam '27, Aadarsh Padiyath (PhD student, University of Michigan), Jean Salac (Assistant Professor of Computer Science, Carleton College)

Supervisors and Institutional Affiliations: Jean Salac (Assistant Professor of Computer Science, Carleton College)

Multiple software systems unintentionally exclude users due to a lack of inclusive design training, making the early integration of critical pedagogy into software design education essential. In this study, we integrated critical pedagogy into an undergraduate software design course through (1) the CIDER assumption elicitation technique and (2) the exposure of values reflected in technology. Students' pre/post responses to the Critical Computing Index reveal that students' personal effectiveness greatly increased after taking the software design course. Our initial analyses suggest that classwork encouraged critical reflection and agency, especially for improvements focused on accessibility, while interviews indicated that students grew from viewing marginalized perspectives as abstract ideals to actively integrating them into their design practices.

This experience was funded by Joan Hanson Endowed Fund for Faculty Development and Teaching in Ethics

Poster #115

Title: *A Summer at the Théâtre de l'Opprimé*

Presenter(s): Peter Kenedi '27

I worked for the Théâtre de l'Opprimé (Theater of the Oppressed) in Paris during the summer of 2025. My principal goal was to learn French; I did whatever I could to practice speaking. I was surrounded by a

lovely team of Parisian actors and administrators who gave me all sorts of work. I left with many friends and a significantly improved grasp of the language, as well as a promise of a warm welcome from the Director, should I ever need work as an actor or otherwise.

This experience was funded by Abeona Endowed Fund for International Internships

Poster #116

Title: *Interning at the Massachusetts Appeals Court*

Presenter(s): Hollin Keyser-Parker '26

This summer I interned for Judge Smyth at the Massachusetts Appeals Court, the APC. I gained a strong understanding of the appellate review process through attending oral arguments, participating in workshops given by the APC judges, and discussing the nuances of the system with my colleagues. I also practiced two pillars of legal work: legal writing and legal research. I drafted the facts sections for the following opinions: *Badgett*, 24-p-239, *A Juvenile*, 24-p-89, and *Toby v. Allied Universal Security Services*, 24-p-657. I proofread one of Judge Smyth's dissents and revised another intern's opinion. I researched case law on issues such as reasonable suspicion in light of a stale tip, Massachusetts precedent on judicial notice, and the non-pejorative legal terminology for a defendant's status as an illegal immigrant. Finally, I worked with Judge Smyth's law clerk to research and discuss the legal side of several issues I am passionate about including free speech, education law, and environmental law. This internship reaffirmed my drive to pursue a career in law for the representation of causes and people who need it.

This experience was funded by The Endowed Internship Fund for Public Service

Poster #117

Title: *Cultural Mediation at Musée en Herbe*

Presenter(s): Laurine Kim '26

Over the summer, I did an internship at Musée en Herbe, in Paris, France. With the cultural mediation team, I was responsible for understanding the details of the ongoing exhibition and being able to give brief introductory presentations at the beginning of the visits, as well as necessary explanations about the interactive parts of the exhibition throughout the visits. This was done both in French and English, and to visitors of varying learning abilities. Additionally, I was responsible for preparing and assisting in leading the fine-art workshops related to the ongoing exhibition, designed for children between the ages of 2.5 to 5 years old and between the ages of 6 to 12 years old. Overall, the internship was a great opportunity for me to develop multiple professional skills; among said skills, I feel the most confident that it reinforced my public speaking skills.

Poster #118

Title: *Laser Heterodyne Radiometry of the Sun as a Star: Beam Synthesis for Mitigating Antenna Pattern Systematics*

Presenter(s): Max Kingston '26

Other Authors/Contributors: Max Morris '27, Ryan Terrien (Associate Professor of Physics and Astronomy, Carleton College)

Supervisors and Institutional Affiliations: Ryan Terrien (Associate Professor of Physics and Astronomy, Carleton College), Ryan Cole (Assistant Professor of Physics)

Observed radial velocity (RV) shifts of stars can indicate the presence of an orbiting exoplanet. However, these measurements are confounded by stellar magnetic activity, atmospheric interference, and telescope systematics. By observing spectra of the sun with a Laser Heterodyne Radiometer (LHR), we aim to separate RV shifts from these other factors. We construct a prototype LHR to identify and mitigate known telescope systematics and present data collected by the new instrument. Through this research, we develop instrumentation and analysis techniques that, in the future, can inform methods for identifying earth sized exoplanets.

This experience was funded by Dr. E.A. Fath Scholarship Research Fund

Poster #119

Title: *Machine Learning Engineer Internship*

Presenter(s): Palmy Klangsathorn '26

Over my nine-week internship, I got the chance to dive into machine learning, large language models, MLOps, and container orchestration while working on projects that pushed me to grow technically. One highlight was helping build a generative AI platform for on-premise company assistants. My role focused on creating a text-to-SQL agent so employees could query private databases in plain English. That project really challenged me to combine natural language processing, database knowledge, and software design to make something both useful and reliable. I also learned a lot about deploying Kubeflow on Kubernetes, which gave me a deeper appreciation for containerized infrastructure. Later, I worked with a teammate and a pre-sales engineer on disaster prediction models and a client-facing interface, experimenting with different ML approaches and building the UI with Svelte and TypeScript. Overall, the internship confirmed my passion for machine learning engineering and showed me how much I enjoy connecting AI, infrastructure, and real-world business needs.

This experience was funded by Trustee Endowed Internship Fund

Poster #120

Title: *Behind the Scenes of Commercial Production: Insights from My Internship at Hungryman*

Presenter(s): Ryder Koll-Bravmann '26

During the summer, I completed an internship with Hungry Man Productions, a leading commercial production company. My work encompassed both production and post-production support, including equipment preparation, logistical coordination, and on-set assistance. These responsibilities provided a comprehensive understanding of the workflow from pre-production through final delivery. In addition, I collaborated closely with producers, directors, and crew members, which strengthened my ability to work effectively in fast-paced team environments. Beyond technical and logistical tasks, the internship afforded valuable opportunities to observe industry professionals, develop professional relationships, and gain insight into the creative and organizational processes that underpin commercial filmmaking. This experience significantly enhanced my technical proficiency, adaptability, and collaborative skills, while also reinforcing my long-term career interest in cinematography and production.

This experience was funded by Wiebolt Endowed Internship Fund

Poster #121

Title: *9-DOF Inertial Measurement Unit Data for Swimming Stroke Classification and Hand Position Estimation*

Presenter(s): Warren Kozak '27

Many high-level athletes benefit from using wearable technology to analyze training details, however there is a noticeable lack of such technology in the world of competitive swimming, due to the complexity of body movements and the challenges induced by the aquatic environment. This project seeks to investigate the effectiveness of utilizing wearable technology, specifically wrist mounted inertial measurement units, to gather accelerometer, gyroscope, and magnetometer data, for use in hand position estimation and stroke classification.

Poster #122

Title: *Internship at the U.S. Department of Commerce, Foreign Commercial Service at the U.S. Embassy in Belgium*

Presenter(s): Manoka Kozaki '26

From June to August 2025, I completed an 11-week summer internship with the U.S. Department of Commerce's Foreign Commercial Service at the U.S. Embassy in Belgium. In this role, I supported my team's efforts to help U.S. companies expand their business in Europe by researching EU and Belgian

regulations, identifying market opportunities and challenges, and preparing drafts for senior Embassy officials. The internship not only strengthened my practical skills and knowledge, but also allowed me to explore my interests in international trade, foreign policy, and business.

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #123

Title: *Real Estate Development Internship*

Presenter(s): Jordan Kramer '26

During my internship with SunCal, I worked on the financial and strategic evaluation of large-scale residential land development projects. My primary responsibilities included building underwriting models, creating cost schedules, and mapping project timelines to assess feasibility. I also contributed to the development of an investor pitch deck that highlighted how SunCal partners with national homebuilders to deliver finished lots and community infrastructure. A major focus of my work was on the Rainbow Canyon project in Temecula, CA, where I analyzed entitlement processes, infrastructure investments, and housing mix strategies. This experience gave me hands-on exposure to the intersection of real estate development, financial modeling, and strategic partnerships, while also deepening my understanding of how large-scale projects move from raw land to functioning communities.

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

Poster #124

Title: *Current Density Coil Applications in Space Weather Forecasting*

Presenter(s): Sophie Kuliyeva '27

Supervisors and Institutional Affiliations: Matthew Argall (Research Associate Professor of Physics, University of New Hampshire)

During my 10-week NSF-funded Research Experience for Undergraduates at the University of New Hampshire, I conducted research under the mentorship of Dr. Matthew Argall in the 410 Research Group. My project, "Current Density Coil Applications in Space Weather Forecasting," focused on designing and testing Rogowski coil sensors to detect current changes linked to space weather activity. I applied electromagnetic principles, including Faraday's Law, to calculate design parameters, build RLC circuits, and 3D print coil cores. I fabricated seven sensors, addressed engineering challenges, and optimized their performance. I also learned how to use Python for data collection and analysis with a signal generator, oscilloscope, and network analyzer. This project deepened my understanding of

instrumentation design and highlighted the potential of precise, low-cost sensors to support future space weather monitoring and forecasting.

Poster #125

Title: *Adolescent Medicine Research*

Presenter(s): Abby Kwart '28

I did qualitative research with an adolescent medicine physician at Kaiser Permanente Washington Health Research Institute. I conducted a literature review on the sources of contraception information for adolescents, as well as contributed to qualitative data analysis of interview transcripts for a contraception decision aid prototype. I also did data organization and other various tasks to support my supervisor.

This experience was funded by Wiebolt Endowed Internship Fund

Poster #126

Title: *Stigma, Moral Agency, and Narrative Self in Substance Addiction*

Presenter(s): Eric Lail '26

Other Authors/Contributors: Daniel Groll (Chair of Philosophy, Professor of Philosophy, Carleton College)

Supervisors and Institutional Affiliations: Alex Woodman (King Fahad Medical Complex), Lori Bruce (Associate Director, Interdisciplinary Center for Bioethics, Yale University)

Substance addiction is a significant and pervasive phenomenon both globally and within the U.S. As a barrier to treatment, stigma places negative labels on addicted persons. The internalization of these negative labels in addicted persons further isolates them from society and treatment. This project examines the consequences that various characterizations of addiction have the status of moral agency for addicted persons, and therefore the stigmatizing attitudes towards this population. Though contemporary models and discussions offer characterizations of addiction that are sensitive to stigmatizing attitudes, there is a lack of personal narratives and conceptualizations of addiction through the first-person lens. This project frames addiction as a loss of self, understanding addiction as a loss of meaningful social relations. A narrative conception of the self with phenomenological descriptions to the first-person experience of the condition offer an insight into this aspect of addiction.

This experience was funded by Joan Hanson Endowed Fund for Faculty Development and Teaching in Ethics

Poster #127

Title: *Project Destiny: An Urban Ministry*

Presenter(s): Michaela Lam '27

Project Destiny is a gospel-based, month-long middle school summer camp in Chinatown. We have charting (chapel), field trips, classes, small groups, and so much more! Many are from lower-income Asian immigrant families, so we connect cultural and language backgrounds while making new, enriching experiences accessible to them. Therefore, we raise support through money and prayers, along with donated meals for camp. Our primary purpose is to model Christian character, love, and hospitality to the young and unreached. As senior counselors, we lived together in Boston's Emerson dorms, and it was the college Christian life I would want. We were at church 24/7 and all working for the same purpose. But it was truly a team dynamic to get used to and practice Christ's love! We each led a small group and class of our own interest, and we relied on the team and God's guidance to carry us through.

Poster #128

Title: *Achieving Full Coverage of the SME Minimal Matter Sector*

Presenter(s): Will Lankenau '27, Danny Shope '26, Caitlyn Holl '28

Other Authors/Contributors: Jay Tasson (Chair of Physics and Astronomy, Associate Professor of Physics, Carleton College), Facundo Lopez '27, Bianca Lott '26, Owen Zhang '26

Supervisors and Institutional Affiliations: Jay Tasson (Chair of Physics and Astronomy, Associate Professor of Physics, Carleton College)

We present a new method for interpreting past measurements of the Lorentz Symmetry-violating degrees of freedom within the minimal matter sector of the Standard-Model Extension (SME), which offers a systematic test framework to search for relativity violations. From one set of data, we obtain: limits on all 25 never-before measured degrees of freedom, improved limits on 56 degrees of freedom, and a set of equations to constrain all 132 degrees of freedom.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences, The Clinton Ford Research Fund, and the Mathews Student Fellowship

Poster #130

Title: *Technology Assistant at Genomics Lab at UChicago*

Presenter(s): Noah Zameer Lee '27

During my Sophomore summer, I was fortunate to get the opportunity to help with the ImLab genomics lab at the University of Chicago. During my 10 weeks there, I conducted Transcription-Wide Association Studies, created chat bots to help with the lab's tool - MetaXcan, and created an onboarding app from an open source project - DuolmGo. It is a Duolingo clone with added features to help with the onboarding process and help new lab members with getting up to speed with the technologies and theory needed to succeed in the lab.

This experience was funded by Class of 1964 Endowed Internship Fund

Poster #129

Title: *VCD-induced menopause accelerates AD pathology*

Presenter(s): Anna Lee '28

Alzheimer's disease (AD) is a progressive neurodegenerative disorder that affects over six million people, 2/3 of the cases being women. Many studies have connected vulnerability to AD with the menopause transition, likely due to hormonal fluctuation that can significantly influence brain activity, cognition, and other neural functions. Although the association between AD and menopause is widely recognized, the underlying mechanisms remain unclear. In this project, we aim to determine how menopause transition periods affect behavior and neural activity.

Poster #131

Title: *My Experience Working With Youth at the Key*

Presenter(s): Sydney Lenz '28

The Key is a non-profit organization that provides a variety of resources ranging from housing to free food to youth around Northfield. It brings power to the voices of the youth in our community and creates an enriching and comfortable environment for growth. I was a staffer at the Key. We did lots of activities with the youth such as played board games, did arts and crafts, cooked meals, and hosted fun events for the youth. While reaching the youth wasn't always easy, this friction overtime turned into much deeper bonds and led to greater trust. This trust and other relational markers were made possible in part due to the internship's design that preserved both my agency and that of the youth. The internship has made my determination to serve youth stronger than ever.

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

Poster #132

Title: *Clinical Researcher at UMN with GI group*

Presenter(s): Zach Leslie '26

Worked as primary statistician on variety of projects with clinicians using large retrospective datasets. Team comprised of gastroenterologists (GI) Group focused primarily on patients with severe comorbidities or diseases which influence quality of life including pancreatic cancer, chronic pancreatitis, achalasia of the esophagus, etc. Questions going in: Pancreatic cancer detection, specifically in populations with class II or higher obesity Surgical interventions for cancer resection Influence of prior bariatric surgery on pancreatic cancer detection How does altered anatomy influence postoperative outcomes? Used python and statistical methods to answer these questions with the National Inpatient Sample and the Nationwide Readmissions Database.

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

Poster #135

Title: *Bridging Legal Practice and Social Impact*

Presenter(s): Yiwen Li '28

During my internship at Merits & Tree Law Offices in Beijing, I focused on cross-border agreements, bilingual contract drafting, and negotiations to explore how law can intersect with social entrepreneurship. I prepared and revised License-in/License-out agreements, due diligence reports, and international contracts, balancing abstract legal principles with practical enforceability. My bilingual writing skills ensured cultural nuance and precision across English and Chinese documents, while participation in client meetings gave me firsthand insight into negotiation dynamics. Two projects were especially formative: a complex real estate debt-collection case and an innovative VR concert collaboration with Korean partners, both requiring meticulous wording to safeguard client interests. The experience deepened my understanding of law as more than regulation: it can bridge business needs and community impact, enable fair partnerships, and spark innovation. Transitioning from academic to legal writing sharpened my attention to detail and affirmed my belief in law as a tool for equity and empowerment.

This experience was funded by Karen Grove Feldt '61 and William A. Feldt '61 Endowed Internship Fund

Poster #133

Title: *Exploring Hongkong Stock Markets and IPO Regulations at Fosun Wealth*

Presenter(s): Hallie Li '28

During my internship at Fosun Wealth in Beijing, I gained hands-on experience in financial research and capital market analysis. My work focused on supporting the investment banking team through IPO due diligence, regulatory research, and market monitoring. I investigated reputational risks of executives using Dow Jones, compiled data from Wind and HKEX on IPO applications and equity refinancing, and studied recent Hong Kong listing rule changes. I also translated and refined IPO prospectuses to improve clarity for team use. These projects strengthened my financial analysis, data handling, and communication skills, while deepening my interest in the intersection of finance, mathematics, and technology. This experience has motivated me to further develop my academic and professional trajectory in finance and data-driven research.

This experience was funded by Kathryn Christen Ramstad '79 Endowed Internship Fund

Poster #134

Title: *Tracing the Communication Network of Late Qing Dynasty*

Presenter(s): Losh Li '28

Other Authors/Contributors: Seungjoo Yoon (Associate Professor of History, Carleton College)

Supervisors and Institutional Affiliations: Seungjoo Yoon (Associate Professor of History, Carleton College)

During the summer of 2025, I worked with Professor Seungjoo Yoon in History on a project investigating the circulation of Enlightenment ideas among the ruling elites of the late Qing Dynasty. The research examined not only the intellectual debates preserved in memorials, letters, and telegrams, but also the physical network through which these ideas were transmitted in Beijing and beyond. Thus, by integrating archival research with spatial analysis of the city's back alleyways (hutongs), we hope to illuminate the understanding of both the textual and the spatial aspects of the late Qing communication networks.

Poster #136

Title: *Accelerating ML Pipeline Exploiting Cloud Resources*

Presenter(s): Leon Liang '26

Supervisors and Institutional Affiliations: Rubayet Rongon (Ph.D. student at Department of Engineering and Computer Science, Washington State University Vancouver), Xuechen Zhang (Professor at Department of Engineering and Computer Science, Washington State University Vancouver)

Modern ML pipelines increasingly operate over remote data stores, where end-to-end performance is often bottlenecked by preprocessing overhead, data transfer latency, and underutilized remote compute resources. We present SCOPE, a system that adaptively offloads preprocessing to remote servers based on real-time resource conditions. SCOPE extends h5py with a dynamic offloading interface, enabling a remote runtime to simulate pipeline execution and generate policies tailored to current workloads and system state. By offloading tasks such as decoding, augmentation, and transformation to idle cloud resources, SCOPE overlaps computation with data transfer, improving throughput while remaining transparent to existing user code.

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

Poster #137

Title: *Optimizing Giant Magnetoresistance & Exchange Biasing for use in Mesoscale Magnetic Dots*

Presenter(s): Yunan Liu '26

Other Authors/Contributors: Barry Costanzi (Assistant Professor of Physics, Carleton College) Kian Hammer '27

For ferromagnets on length scales where neither classical nor quantum mechanical effects dominate, magnetic configurational states arise due to the interplay of the two. Previous work characterizing these configurations relied on small magnetization-dependent changes of resistance of the magnetic material due to the Anisotropic Magnetoresistance (AMR) effect. However, increasingly small geometries have led to decreased signal strength, with recent measurements approaching the intrinsic background noise in the system. This motivates the use of Giant Magnetoresistance (GMR) instead, which provides a much larger change in resistance with configurational change. The work presented here focuses on optimizing the procedure needed to produce the largest GMR effect. We have achieved a bulk exchange-biased GMR heterostructure using magnetron sputtering which displays magnetoresistance an order of magnitude larger than AMR. Next steps will see this heterostructure implemented in mesoscale particles to more clearly measure configurational states.

This experience was funded by Physics and Astronomy Department at Carleton College

Poster #138

Title: *Quantum Communication Protocols Utilizing Higher Dimensional Embedding*

Presenter(s): Facundo Lopez '27

We propose a novel Quantum Dense Coding protocol, 'Embedded Dense Coding'. Embedded Dense Coding utilizes higher dimensional quantum state embedding to maximize the information contained within a single quantum state for a given entanglement resource. This protocol has fidelity advantages when subject to specific kinds of noise and shows promise as a more efficient communication protocol.

Poster #139

Title: *Investigating the Effect of Long-term Oral Administration of Different Dosages of Caffeine on Anesthetic Emerging Time in Rodents*

Presenter(s): Gloria Ma '29

Supervisors and Institutional Affiliations: Sun Jianhua (Shanghai Institutes of the Chinese Academy of Sciences)

To investigate the effect of prolonged oral ingestion of different doses of caffeine on anesthetic emergence time. Eighteen male mice were selected and randomly divided into three groups of six mice, each according to the concentration of caffeine administered: a high-concentration caffeine group, a low-concentration caffeine group, and a blank control group. Mice were anesthetized with isoflurane and Zoletil 50, and the time of emergence was recorded for both anesthesia and the time of entry into anesthesia was recorded for Zoletil 50 anesthesia. Twenty-four hours after the anesthesia experiments, the mice were subjected to Morris water maze experiments, visual station experiments, hidden station experiments, and spatial exploration experiments. Both high-dose and low-dose coffee ig accelerated isoflurane and Zoletil 50 anesthesia emerging, with the high-dose being statistically more significant for the acceleration of anesthesia emerging. Prolonged oral coffee administration did not affect the time to enter anesthesia. Long-term oral coffee administration enhanced spatial exploration and spatial learning memory after anesthesia.

Poster #140

Title: *Language and Climate in French Elementary Education*

Presenter(s): Meg MacLaury '27

This summer I completed a two-part internship in Paris, first at an elementary school and then at an outdoor summer camp just outside the city. At the school, École élémentaire Vulpian, I spent my time observing lessons, paying particular attention to the ways French is taught to native speakers. At the summer camp, Tourelles 2, a nature space funded by the French government as part of an effort to build

environmental awareness, I helped my team set up each day, facilitate activities, and orient campers and counselors to the space. I also spent a lot of time thinking about the impact of playing outside on raising awareness for the environment. All of this work was done entirely in French, so a major piece of this experience was my personal effort to gain confidence and skill in French communication.

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

Poster #141

Title: *Statistics of Forensic Decision-Making*

Presenter(s): Josh Madigan '27, Ximena Colmenares '28

Other Authors/Contributors: Amanda Luby (Assistant Professor of Statistics, Carleton College), Vivian Du '27, and Audrey Moyer '27

Supervisors and Institutional Affiliations: Amanda Luby (Assistant Professor of Statistics, Carleton College)

This is ongoing research investigating the decision-making and reporting styles of forensic scientists. In many forensic science disciplines, there is no objective way to determine whether two fingerprints, bullets, or handwritten documents come from the same person or not. Instead, it is the responsibility of each individual analyst to make a subjective decision and communicate their results to a judge or jury. Since examiner conclusions can influence investigator, judge, and jury decisions, it is important to measure and understand the range of individual differences in reporting styles before adopting a more complicated scale. This project aims to make substantive recommendations to practitioners, develop software for fitting statistical models, and investigate the performance of models through simulation.

This experience was funded by Elaine Tatham '58 Endowed Fund for Mathematics and Statistics, Cris Roosenraad Endowed Fund for Student Research, Carleton College Summer Science Fellowship, Math & Statistics Department at Carleton College, Harry A. and Margaret D. Towsley Foundation Fel

Poster #142

Title: *Surveying Springs in the Driftless*

Presenter(s): Rebecca Marshall '27, Pilar Andruet '27, Malia Reeg '26

Other Authors/Contributors: Chloé Fandel (Assistant Professor of Geology, Carleton College), and Augusta Gruhlke '26, Margaret Benson '26 Malia Reeg '26, Eve Mullen '27, Pilar Andruet '27.

Supervisors and Institutional Affiliations: Chloé Fandel (Assistant Professor of Geology, Carleton College)

The purpose of this project was to conduct a synoptic survey of 302 springs in summer baseflow across the Driftless Region, an area defined by geologic rather than political boundaries. In order to get a snapshot of springs over the region, we measured the same qualities at each spring, including pH, conductivity, and flow rate. Ninety-eight springs were sampled for major ions and more precise nitrate measurements. Data was collected between July 7th and September 12th to ensure that groundwater was in summer baseflow. We dedicated the summer to data collection, and plan to analyze the data over the next year. We hope to learn why certain springs are more resilient and how we can better protect springs in the future.

This experience was funded by NSF Grant

Poster #143

Title: *A Post-Yugoslavia Era: Bosnia's struggle for Independence, Identity, & Justice 30 years after the war*

Presenter(s): Lejla Mehmedovic '27

I spent this summer in Bosnia and Herzegovina where I interned at the Post-Conflict Research Center in Sarajevo. As an intern, I conducted interviews, wrote articles for the BalkanDiskurs, attended conferences, and made visits to important offices such as the Office of the High Representative and the European Union Delegation of Bosnia and Herzegovina. I also had the honor of participating in the 2025 Srebrenica Youth School, where I visited the Srebrenica-Potocari Memorial Center and participated in the International Day of Reflection and Commemoration of the 1995 Genocide in Srebrenica.

This experience was funded by Larson International Fellowship

Poster #144

Title: *Naloxone Administration Disrupts Paced Mating Behavior in Sexually Naive, but not Experienced, Female Rats*

Presenter(s): Alexei Mendez '27

Other Authors/Contributors: Leomara H. Swanson '25, Antao Shao '25, Tyler R. Beasley '24, Sarah Meerts (Program Director of Neuroscience, Professor of Neuroscience and Psychology, Carleton College)

Supervisors and Institutional Affiliations: Sarah Meerts (Program Director of Neuroscience, Professor of Neuroscience and Psychology, Carleton College)

Paced mating behavior is enhanced by sexual experience. Whether opioid systems are necessary for experience-enhanced sexual behavior or mating once rats are sexually experienced is unknown. In Experiment 1, adult, ovariectomized, hormone primed, sexually naive rats received naloxone (4 mg/kg),

an opioid antagonist, or saline (1 ml/kg), immediately before four tests of paced mating behavior. Rats received a 5th drug-free test. Proceptive behaviors and time with the male increased for both groups across the tests. However, only saline-treated rats exhibited shorter contact-return latencies to intromission and increased time with the male on test 4 vs test 1. Naloxone disruption persisted in the drug-free test. In Experiment 2, mating of sexually experienced rats did not differ between naloxone and saline. Blocking opioid receptors in sexually naive rats disrupts some aspects of experience-enhanced mating behavior, indicating that the opioid system contributes to acquisition of sexual experience.

This experience was funded by Psychology Department at Carleton College

Poster #145

Title: *Leveraging Symbiotic Co-Evolution for Improved Problem-Solving*

Presenter(s): Camila Mendoza '28

Other Authors/Contributors: Anya Vostinar (Assistant Professor of Computer Science, Carleton College), Elias Hillman-Emelianoff '27, and Taha Khalili '27

Supervisors and Institutional Affiliations: Anya Vostinar (Assistant Professor of Computer Science, Carleton College)

Co-symbiotic relationships have existed for a prolonged period of time, so much so that if we want to explore the inner-workings of how organisms have evolved, these relationships must be taken into account for more accurate understanding. This research aims to uncover how factors outside of these symbiotic relationships, such as catastrophic events, can affect the evolution of organisms. Using the SymbuLab, an artificial life software tool, we created virtual simulations to manipulate world settings and extrapolate the organisms' responding behavior through solving complex tasks. The results revealed that stressor events might not create enough pressure on the hosts to affect the evolution of their problem-solving skills. Therefore, the evolution of co-symbiotic relationships may not be dependent on catastrophic events. This work can help highlight the need for further research into how evolution is multi-faceted, and that testing real-world factors could help us further how evolution works.

This experience was funded by Hewlett and Mellon Fund for Faculty Development

Poster #256

Title: *Modeling Dual Gene Drive Dynamics in Panmictic Populations*

Presenter(s): Emma Yao '27

Gene drives are genetic systems that can bias inheritance, enabling the rapid spread of traits through populations. This summer, I developed computer simulations of gene drive systems using the SLiM

population genetics framework at Peking University's School of Life Sciences (Champer Lab). My project focused on exploring how multiple gene drives interact in structured populations and whether suppression outcomes can be reliably achieved. I wrote and debugged models, conducted large-scale simulation trials, and analyzed results with R and Python to visualize allele dynamics and population outcomes. Preliminary results suggest that suppression gene drives can be effective in panmictic contexts. This work contributes to the computational research informing experimental gene drive design. The project strengthened my skills in computational biology and highlighted the value of interdisciplinary approaches to addressing global challenges.

This experience was funded by Chang-Lan Endowed Fund

Poster #146

Title: *Field and Experimental Constraints on Carbon Dioxide Removal Potential of Basalt Applied to Acidic Soils in the Midwest*

Presenter(s): Declan Miller '26, Amelia Carson '27

Other Authors/Contributors: Dan Maxbauer (Assistant Professor of Geology, Carleton College), Amelia Carson '27

Supervisors and Institutional Affiliations: Dan Maxbauer (Assistant Professor of Geology, Carleton College)

Enhanced rock weathering (ERW) is an emerging carbon dioxide removal strategy that relies on optimized applications of crushed rock to soils in agricultural lands to accelerate natural weathering reactions. Central to the climate mitigation potential of ERW is both the rate at which the applied rock weathers to release base cations and the transport time for those base cations to flush through soil and watersheds to achieve permanent carbon removal in the oceans. Here, we present data from field and laboratory experiments testing basalt applied to mildly acidic soils from the Midwestern U.S. that help to constrain the rate of base cation release from ERW in this system. Growing season data from lysimeter collected porewater chemistry within field plots, base cation concentrations from soil-rock slurry tests, and infiltration rates from local water balance modeling will be evaluated together to provide initial constraints on carbon dioxide removal potentials of ERW for this new, on-going field trial.

This experience was funded by NSF Grant

Poster #147

Title: *Remote Work for International Investing Consultation Internship*

Presenter(s): Abdulrahman Mohamed '26

Throughout the summer, my role was market-based research for clients interested in emerging industries in various countries. Specifically, my role was to specialize in market entry, strategy, and wealth management services.

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

Poster #148

Title: *Southern Birth Justice Network*

Presenter(s): Sasha Monks '26

This summer, I interned at Southern Birth Justice Network (SBJN), a 501(c)(3) tax-exempt, nonprofit organization that improves access to community-based midwifery and doula care through its perinatal services, workforce development, and community advocacy. My goals were to explore the different aspects of non-profit work and identify which roles (particularly clinical) would like to pursue further, and to learn how to best provide culturally informed care and work while infusing birth justice into every action. My role as an Outreach and Advocacy Intern allowed me to explore both programming and clinical care, leading me to an interest in Nurse Midwifery.

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #149

Title: *Written in Light: Determining Stellar Population Classification for Red Clump Stars Using Low-resolution Spectra*

Presenter(s): Ian Morgan '27

Other Authors/Contributors: Andreia Carrillo (Assistant Professor of Physics and Astronomy, Carleton College), Maddie Lucey, (Postdoctoral fellow, University of Pennsylvania), Maria Jose Bustamante Rosell, (Postdoctoral fellow, Fisk/Vanderbilt)

Supervisors and Institutional Affiliations: Andreia Carrillo (Assistant Professor of Physics and Astronomy, Carleton College)

We set out to examine the kinematics and chemo-dynamics of 11 Red Clump (RC) stars, chosen at >10 kpc, in the optical range, and at $R \sim 3000$ with the goal of classifying these stars into the thick disk or halo

population. We utilized the program iSpec to retrieve chemical abundances for further classification. We use RASSINE for continuum normalization, run the radiative transfer code MOOG on the spectra, and achieve 4% error on the stellar parameters. We find continuum normalization with RASSINE performs better (by 3%) than traditional cubic spline interpolation. Stellar parameter determination also affects iSpec's correct determination of the chemical abundances with effective temperature, surface gravity, and metallicity all affecting chemical abundance determination accuracy by 3-11%. Overall, we find promising results in determining stellar parameters and chemical abundances with our low-resolution spectra, which—when combined with the kinematics—ultimately helps us in our characterization of the halo/disk interface.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #150

Title: *Changes in Tau Phosphorylation Following Traumatic Brain Injury in Humanized Mouse Model*

Presenter(s): Madeline Morrison '26

Traumatic brain injuries (TBIs) affect 2.5 million people per year, with mild TBIs (mTBIs) representing 80-90% of all cases. Following TBIs, tau proteins, which are essential for neuronal structure, can phosphorylate and disassociate from microtubules in the neuron, before accumulating in the soma and disrupting cell function. This accumulation of tau is also strongly associated with the onset of Alzheimer's Disease. We examined the temporal progression of tau accumulation in mice with human gene replacement following TBIs to determine the plausibility of recovery over time. We found a reduction in tau pathologies 1 month post-TBI compared to 1 week post-TBI, which may have implications for the prevention of Alzheimer's Disease.

This experience was funded by Carleton College Class of 1963 Student Research Fellowship

Poster #151

Title: *Regioselectivity in Chalcone Additions Using Photoredox Catalysis*

Presenter(s): Zoe Morton '26, Lizzy Johnstone '27, Noah Reid '26, Matilda Pro '27, Lisa Li '27

Other Authors/Contributors: Kaz Skubi (Assistant Professor of Chemistry, Carleton College)

Supervisors and Institutional Affiliations: Kaz Skubi (Assistant Professor of Chemistry, Carleton College)

Radical chemistry reactions have long been studied for their unique selectivity. We investigated conjugate addition of radicals to chalcones, where a new C-C bond is formed at either the α or β

position. This is distinct from the traditional two-electron reaction where only β addition is observed. Notably, this synthetic method for both α and β addition has applications in the development of new pharmaceuticals and fine chemicals. In order to study our reaction's unique ability to add to either position on a conjugate acceptor, we modified three factors: changing the electronic character of the chalcone, the identity of the radical, and the reaction solvent. This systematic approach allowed us to further our understanding of the electronic factors that govern radical conjugate addition.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences, American Chemical Society Petroleum Research Fund

Poster #152

Title: *Lidar Analysis of the Island of Patmos, Greece*

Presenter(s): Sam Much '27

Other Authors/Contributors: Alex Knodell (Director of Archaeology, Professor of Classics, Carleton College)

Supervisors and Institutional Affiliations: Alex Knodell (Director of Archaeology, Professor of Classics, Carleton College)

I conducted lidar analysis on data from Patmos, Greece, in order to explore the island's pre-monastic past and to support an upcoming pedestrian survey. We used various models, such as a digital terrain model, to detect features and analyze land use. Preliminary results show terracing over large areas of the island, indicating agricultural land use on the island, along with field systems and paths. These findings provide a prioritized set of targets for field documentation. The project is aimed at contributing new evidence for settlement and land-use history on Patmos, which has been understudied compared to the monastic history of the island. The project also intends to analyze the use of lidar in the context of Greek archaeology, where it has been used less extensively than in other regions of the world.

This experience was funded by Humanities Center for Student Research

Poster #153

Title: *Molecular Determinants of a Cooperative Antibody Interaction During Peanut Oral Immunotherapy*

Presenter(s): Emily Muenzer '26

Supervisors and Institutional Affiliations: Orlee Marini-Rapoport (Research Technician in the Center for Immunology & Inflammatory Diseases, Massachusetts General Hospital, Harvard Medical School), Sarita Patil (Assistant Professor, Hospital/Harvard Medical School)

Peanut oral immunotherapy (OIT) can induce sustained tolerance in some allergic individuals, yet the molecular mechanisms underlying this variability remain unclear. This study investigates the development and cooperative interactions of neutralizing antibodies (nAbs) targeting the peanut allergen Ara h 2. Using single B cell PCR cloning from OIT clinical trial participants, patients with increased IgG responses associated with tolerance were identified. Structural and binding analyses revealed that the T1 germline (GL) nAb does not bind Ara h 2 independently but engages in cooperative binding when paired with T5 mAb. Junctional insertions in T1 and a critical salt bridge were found to be essential for this interaction. Mutagenesis studies further confirmed the importance of specific residues in cooperative binding. These findings highlight a germline-encoded mechanism for antibody cooperativity and provide insight into designing next-generation therapies for peanut allergy by leveraging germline features that support sustained tolerance.

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

Poster #154

Title: *Making A Difference: My Political Consulting Internship Experience*

Presenter(s): Tej Murthy '27

During the summer of 2025, I interned with The Advance Group (TAG), a political consulting firm in New York City. My work supported campaign strategy, nonprofit advocacy, and client outreach through research, communications, and event-based projects. I assisted in creating outreach tools, organizing partnership data, and summarizing client meeting discussions to inform actionable strategies. A significant project involved supporting New York Communities for Change (NYCC), where I conducted on-the-ground outreach, attended community events, and helped secure local sponsorships for underserved populations. These experiences gave me direct insight into how consulting firms balance research and strategy with practical execution, while also highlighting the importance of adaptability and collaboration. Overall, the internship strengthened my communication skills, broadened my understanding of grassroots organizing, and demonstrated how even small contributions can have a meaningful impact on political and community outcomes.

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #155

Title: *Computational Investigation of the Gas Adsorptive Properties of Zeolites in Energy-Relevant Applications*

Presenter(s): Kiran Myneni '28, Elisabeth Arnell '27

Other Authors/Contributors: Daniela Kohen (Professor of Chemistry, Carleton College)

Supervisors and Institutional Affiliations: Daniela Kohen (Professor of Chemistry, Carleton College)

Zeolites are useful in energetically relevant applications due to their ability to adsorb and store gases. In fertilizer production, zeolite membranes are proposed as an alternative mechanism to reduce the energetic cost of ammonia synthesis. Before examining the ability of different frameworks to separate ammonia from unreacted gases, we used First-Principles Molecular Dynamics to consider cation movement in the zeolite LTA at the high temperatures of ammonia synthesis, and the possible interconversion between crystal structures of the zeolite MFI, whose structural similarities contrast with their different adsorption properties. Zeolites are also being explored as storage methods for natural gas in automotive vehicles, with the goal of replacing gasoline use. However, impurities in natural gas mixtures may affect the reusability of these zeolite tanks. The accumulation of impurities in different adsorbent materials was studied using Gibbs Ensemble Monte Carlo simulations and found to occur in differing quantities across all materials.

This experience was funded by U.S. Department of Energy, Award Number DE-SC0023454

Poster #156

Title: *Restoring *Pedicularis canadensis* and *Comandra umbellata*, Two Hemiparasitic Species, into Carleton's Arboretum*

Presenter(s): Nicholas Nguyen '26

Other Authors/Contributors: Kate Nootenboom '20, Avery Blumenthal '23, Katrin Birk '25, and Vo Dominguez '25, Nancy Braker (Puzak Family Director of the Cowling Arboretum, Senior Lecturer in Biology, Carleton College)

Supervisors and Institutional Affiliations: Nancy Braker (Puzak Family Director of the Cowling Arboretum, Senior Lecturer in Biology, Carleton College)

This poster highlights the work the Arboretum has done to restore two hemiparasitic species, *Pedicularis canadensis* and *Comandra umbellata* into existing prairie restoration. For *P. canadensis*, two studies were conducted, one for planting methods and one to determine the most efficient seeding rate. For *C. umbellata*, studies were conducted to determine if sod transplant and seeding were effective at introducing *C. umbellata* to existing prairie restorations. We determined that scatter planting and planting *P. canadensis* seeds under the soil surface did not yield statistically significant

difference and that a high seeding rate of more than 100 seeds per square feet should be used to establish *P. canadensis*. Both sod transplant and seeds are effective at establishing *C. umbellata*.

This experience was funded by William and Elizabeth Muir Endowed Fund

Poster #157

Title: *Neurogenesis in Males*

Presenter(s): Olivia Nicol '26

Other Authors/Contributors: Jennifer Ross-Wolff (Director, Perlman Center for Learning and Teaching Humphrey Doermann Professor of Liberal Learning Professor of Biology, Carleton College), Andrea Kalis (Senior Lecturer and Lab Coordinator Biology Department, Carleton College)

Supervisors and Institutional Affiliations: Jennifer Ross-Wolff (Director, Perlman Center for Learning and Teaching Humphrey Doermann Professor of Liberal Learning Professor of Biology, Carleton College), Andrea Kalis (Senior Lecturer and Lab Coordinator Biology Department, Carleton College)

This project examined behavioral and genetic differences in *C. elegans* with masculinized ventral cord neurons (P-masc). We tested diacetyl chemotaxis behavior and found that P-masc worms showed responses intermediate between males and hermaphrodites. SNP mapping localized the P-masc insertion to chromosome I. These findings highlight how altering sex-specific neurons shapes behavior and provide insight into the link between neural circuits and sexual dimorphism.

Poster #158

Title: *Alo Health: Health for Every Woman, Every Step, Every Stage.*

Presenter(s): Narjis Nusaibah '26

Women in Bangladesh face major barriers to healthcare access. Alo Health, a non-profit that was founded to bridge this gap, delivers respectful and practical healthcare for women in underserved communities across Bangladesh. We provide clinical services, patient education, and community support while collecting data on health outcomes, service use, and socio-economic factors. Research insights guide policy recommendations, which strengthen care delivery, creating a feedback loop that continuously improves services. This integrated approach reduces barriers to care, empowers women, and informs evidence-based health programs that are responsive, sustainable, and scalable.

This experience was funded by Karen Grove Feldt '61 and William A. Feldt '61 Endowed Internship Fund

Poster #159

Title: *One-Directional Action Potentials for Vagus Nerve Stimulation*

Presenter(s): Daniel Nykamp '26

Supervisors and Institutional Affiliations: Tay Netoff (Professor of Biomedical Engineering, University of Minnesota)

While vagus nerve stimulation can treat certain brain diseases, there are negative side effects caused by the stimulation of the neck muscles. To mitigate the side effects, we investigated how a vagus nerve stimulator could send an action potential to the brain but not the neck muscles. We simulated two scenarios theorized to produce a one-directional action potential. In the first, a series of electrodes creates interference effects that cancel out one direction of the action potential. In the second, a high-frequency stimulation blocks one direction of the action potential. Using the second method, we found an electrode configuration that produces no onset response and blocks the action potential.

This experience was funded by Class of 1970 Endowed Internship Fund

Poster #160

Title: *Sex Differences in Boxelder (*Acer negundo*) Flowering Phenology*

Presenter(s): Cameron O'Connor '27, Hank Langer '28, Kjome Fischer '28, Miranda Asad '28

Other Authors/Contributors: Carly Boies '27, Miranda Asad '28, Ostap Hrebenuk '28, Mark McKone (Towsley Professor of Biology & Research Supervisor of Cowling Arboretum, Carleton College)

Supervisors and Institutional Affiliations: Mark McKone (Towsley Professor of Biology & Research Supervisor of Cowling Arboretum, Carleton College)

Previous research suggests that males may flower earlier than females in some separate-sexed (dioecious) temperate trees, with potential consequences for pollination. We investigated flowering phenology of dioecious boxelder (*Acer negundo*) trees in the Carleton Arboretum. Flower condition was observed in 16 male and 16 female trees approximately three times per week in spring 2025. Male pollen release was clearly detectable visually; 50% of flowers had released pollen by 28 April on average. Female receptivity was less obviously visible, so we used two criteria. Based on the first time emergent stigmas were visible, females reached 50% flowering by 25 April, significantly earlier than 50% pollen release by males. But by the criterion of female flower-stalk elongation, females reached 50% flowering on 28 April, the same date as males. Further investigation of the precise timing of stigma receptivity will be necessary to evaluate the potential flowering mismatch between female and male boxelders.

This experience was funded by Biology Department at Carleton College

Poster #161

Title: *Counseling Works: Through an Administrative Lens*

Presenter(s): Magali O'Connor '26

This summer internship was to expand knowledge and experience at a counseling practice. With the few months spent at Counseling Works, insight to displaying the authenticity of a clinician as well as supporting their values and background formed a strong foundation to this internship. In addition, conversations with clinicians, at various stages in their career, further expanded upon what it means to work at a counseling practice.

This experience was funded by Rob White '85 Endowed Internship Fund

Poster #162

Title: *Teaching Minnesota: Interpreting Indigenous Narratives at Historic Sites*

Presenter(s): Lydia Olson '26

In the summer of 2024, I participated in the Native American Undergraduate Museum Fellowship at the Minnesota Historical Society (MNHS) in St. Paul. The fellowship introduces students to the museum field through three weeks of seminars and a seven-week internship program. For my internship, I worked with the Interpretive Resources department to research Minnesota's native history and compile information regarding each historic site overseen by MNHS. With guidance, I wrote handouts for historic sites and staff during the summers of 2024 and 2025.

Poster #163

Title: *Uncovering the Effect of Model Weights on Politically Based Prompts*

Presenter(s): Jamal Omosun '26

Supervisors and Institutional Affiliations: R Michael Alvarez (Flintridge Foundation Professor of Political and Computational Social Science, Caltech), Danny Ebanks (Postdoctoral Research Fellow, Harvard University), Mitchell Linegar (PhD Candidate, Caltech)

This project investigates how variations in large language model (LLM) weights affect the outcomes of politically based prompts. Using Llama-3.1/4, we evaluate how weight adjustments influence generated text, bias, and consistency in responses. The research provides insights into model transparency and the implications of fine-tuning for politically sensitive contexts.

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

Poster #164

Title: *Building Connections Through Community Health Engagement*

Presenter(s): Matthew Onyango '28

This summer, I interned with Compassionate Health Initiative (CHI) in Kisumu, Kenya, a nonprofit focused on improving access to healthcare through community engagement. My role centered on supporting health awareness campaigns, assisting with community dialogues, and helping organize outreach events on topics such as vaccination, maternal health, and nutrition.

Poster #165

Title: *Product Development at SayKid*

Presenter(s): Kritika Pandit '26

This summer, I interned remotely at SayKid, focusing on email marketing and backend automation in the first half and game development in the second. I redesigned the backend workflows by building a custom MailerLite API integration and removing reliance on Zapier. I boosted family engagement through personalized onboarding flows, playful nudges, and screen-free activity guides. On the product side, I developed and tested voice-based learning games that made ToyBot more interactive and aligned with play-based learning.

This experience was funded by Solhem Business Fellowship Fund

Poster #166

Title: *Simulating Microvalve Performance Using Finite Element Analysis*

Presenter(s): Livi Peters '26

This summer I worked with Dr. Charles DeBoer at the Stanford University Byers Eye Institute. My project focused on studying the performance of silicone microvalves to be used in a drug-delivery device that can be implanted in the eye. I used COMSOL Multiphysics to perform large deformation finite element analysis to simulate the behavior of microvalves, then fabricated microvalves in the lab to test them experimentally. After repeatedly tweaking my model and gathering data, my simulation results could be correlated with my experimental measurements. I provided insight that will improve the design of microvalves in the drug-delivery device in hopes of increasing precision and reliability.

This experience was funded by Marrella Endowed Internship Fund

Poster #167

Title: *Increased Neutrophil Extracellular Traps in Tamoxifen Treated Breast Cancer Patients*

Presenter(s): Evelyn Ponce '26

Our lab has shown that tamoxifen (TAM) triggers neutrophil extracellular trap (NET) formation, which have been linked to cancer metastasis development. Because tamoxifen is the mainstay of treatment for ER+ breast cancer, this study explores whether NETs in breast cancer patients increase proportionately with the longer use of tamoxifen. Patients with ER+ breast cancer were divided into two groups based on TAM duration: 0-6 months and 5+ years. Neutrophils were purified from patient blood samples. The neutrophils were cytocentrifuged and stained with SYTOX Green. NETs were quantified manually by method standardized in the lab. Publicly available Gene Expression Omnibus (GEO) datasets were analyzed for relevant genes impacting NET formation in patients categorized as TAM responders and non-responders. Significantly higher levels of NETs were found in breast cancer patients on tamoxifen for 5+ years compared to patients in the 0-6 months group. GEO data analysis revealed that LTF, an inhibitor of NETs, has a lower expression in non-responders compared to responders. Longer duration of tamoxifen treatment appears to induce higher NET formation in breast cancer patients. Ongoing studies in our lab are investigating the impact of TAM induced NETs on TAM resistance in tumor cells. Our research into this topic could have implications in personalizing TAM prescription to optimal duration and minimizing complications associated to NET formation.

Poster #168

Title: *Chaos and Entropy in Ensembles*

Presenter(s): Saayan Prasad '28

Other Authors/Contributors: Arjendu Pattanayak (Professor of Physics, Carleton College)

Supervisors and Institutional Affiliations: Arjendu Pattanayak (Professor of Physics, Carleton College)

Characterizing the thermalization of a probability distribution or the entropy dynamics of ensembles in systems far from equilibrium is both a fundamental and difficult task. In such cases, the probability density function or ensemble contains all necessary information but is computationally expensive, often prohibitively. A recently proposed technique, the PI entropy, uses the dynamics of correlation between initial neighbors as a proxy for the thermodynamic entropy. In this paper we test the effectiveness of PI entropy for the Duffing oscillator and find that it is indeed able to differentiate and characterize ensemble thermalization as resulting from the transition between chaotic and regular regimes as well due to the effect of dissipation.

This experience was funded by Clinton Ford Research Fund

Poster #169

Title: *Development of PSiP Pincer-Type Ligand Frameworks Featuring Central N-Heterocyclic Silyl and Silylene Donors*

Presenter(s): Dina Prohovsky '26

Other Authors/Contributors: Matt Whited (Chair of Chemistry, Professor of Chemistry)

Supervisors and Institutional Affiliations: Matt Whited (Chair of Chemistry, Professor of Chemistry)

Pincer type ligands can stabilize unusual bonding between metals and metalloids, including highly reactive multiple bonds. The unique ambiphilic properties of polarized metal-metalloid double bonds allow for complexes that engender new, tunable reactivity. Previous work in our research group with cobalt silylene complexes has focused on tuning the properties of the cobalt metal center. Here we report new structural frameworks that allow for tuning the reactivity of the silicon center by introduction of π -donating substituents and a hemilabile donor. This poster will address the preparation of new ligand frameworks allowing access to N-heterocyclic silyl and silylene cobalt complexes, as well as preliminary studies of their reactivity.

This experience was funded by RUI: CAS-SC: Promoting Group-Transfer Reactions at Metal/Main-Group Bonds

Poster #170

Title: *Light Exposure Increases Cell Death and Proinflammatory Cytokine Production in Macrophages*

Presenter(s): Rachel Punter '28

Other Authors/Contributors: Angel Solis (Assistant Professor of Biology Department, Carleton College), Xiaohan Emily Zhang

Supervisors and Institutional Affiliations: Angel Solis (Assistant Professor of Biology Department, Carleton College)

This research project investigated if light plays a role in the regulation of inflammation. With the presumption that visible light stimulation may serve as a tissue microenvironmental factor of macrophage migration to the skin to initiate inflammation, we sought to understand how light may affect cytokine production and cell viability. Using macrophage cell line RAW264.7, we performed a series of ELISAs, MTT assays, and LDH release assays, controlling for light and stimulation with live bacteria or bacterial molecules. We observed that light stimulation leads to increased cell death and proinflammatory cytokine production. Specifically, LDH and IL1 β are released more by macrophages stimulated with light and LPS + nigericin than without light. The LPS + nigericin stimulation lead to increased IL1 β and LDH, but not TNF, release compared to LPS and live bacteria stimulation with light.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #171

Title: *Bacterial Expression of Aminoacyl-tRNA Synthetases from Two Flatworms*

Presenter(s): Conlan Ramirez '26

Other Authors/Contributors: Joe Chihade (Professor of Chemistry, Carleton College), Hailey Westrup '27

Supervisors and Institutional Affiliations: Joe Chihade (Professor of Chemistry, Carleton College)

This research project focused on a set of enzymes, aminoacyl-tRNA synthetases (ARSs), due to their importance in protein synthesis machinery. They are good targets when treating infectious diseases caused by parasitic organisms like helminths (parasitic worms), which are the organisms we are targeting with our research. The genes for ARS proteins in helminths have been previously identified, so we produced and characterized those proteins so they could be evaluated as drug targets. If successful, the drug could be used to stop protein synthesis in helminths which would kill and eliminate them from an infected person.

Poster #172

Title: *Stressors Differentially Affect Grooming Behavior in Drosophila melanogaster*

Presenter(s): Marelly Ramirez Cortes '27, Lanmeng (David) Li '26, Christopher Pliego Rodriguez '26

Other Authors/Contributors: Eric Hoopfer (Assistant Professor of Neuroscience, Carleton College)

Supervisors and Institutional Affiliations: Eric Hoopfer (Assistant Professor of Neuroscience, Carleton College)

Animals and humans often engage in repetitive self-directed behaviors, such as grooming, in response to stress. In humans, self-grooming can become pathological during periods of stress or in certain neuropsychiatric disorders. The neural mechanisms linking stress and grooming remain poorly understood. We examined whether *Drosophila melanogaster* alter grooming behavior after exposure to three types of stressors: heat, social defeat, and social isolation. We find that male flies show an increase in percent time grooming after heat exposure, while males that were socially isolated displayed less total grooming. In contrast, males that won or lost a single fight did not differ in the amount of grooming. Our findings show that grooming responses in *Drosophila* vary depending on the type of stressor. This work advances understanding of the link between stress and grooming in *Drosophila* and provides a framework for dissecting the neural and genetic mechanisms underlying the development of pathological self-grooming.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #173

Title: *Food Access Internship at the Community Action Center*

Presenter(s): Moriah Reusch '27

Food insecurity is a major issue in our society today that stems from larger systemic inequities; many people in our communities may struggle to afford or otherwise access healthy and nutritious food, even as there is also a major problem with food waste within food suppliers. The Community Action Center in Northfield seeks to help promote a healthy and equitable community by providing resources such as the food shelf program. I was fortunate to be engaged in assisting with this program at the main Northfield location and satellite location at Northfield Community Education Center for the duration of the summer.

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

Poster #174

Title: *Trailblazing: Strategy & Business Development with Bright Path Portfolios*

Presenter(s): Luke Revell '28

At Bright Path Portfolios my main responsibility was the development of the client base. Much of my time was spent optimizing the mediums in which potential partners were contacted and actively contacting possible clients. I also had the opportunity to assist in hiring and sit in on venture capital presentations. I worked closely with the founder of the company, Dan Gold.

This experience was funded by Welsh Family Endowed Internship Fund for High Growth Industries

Poster #175

Title: *Copepod Population Affects *S. solidus* Infection Success but Not *Cercomere* Development*

Presenter(s): Edith Reyes Contreras '25

Other Authors/Contributors: Shira Dubin '25, Peaches Cooper '27, and Amanda Hund (Assistant Professor of Biology, Carleton College)

Supervisors and Institutional Affiliations: Amanda Hund (Assistant Professor of Biology, Carleton College)

This poster is focused on my summer research on the parasitic tapeworm *Schistocephalus solidus* infection intensity and development in its first intermediate host, the copepod. We looked at what proportion of copepods got infected, differences in infection success between copepod populations, and whether tapeworms develop faster or slower in some copepod populations. We found that Trout, a

naïve population, has the lowest infection success, and Echo had the highest infection success, consistent with its heavily infected fish. Cercomere development did not differ by population but was influenced by coinfection. Tapeworms were more likely to develop a cercomere when three parasites were present in the host. This research has implications for tapeworm transmission through the tapeworm's complex life cycle.

This experience was funded by NSF Grant #2243076

Poster #176

Title: *Are Life-Forms Real? Philosophy of Biology and the 'Transcendental Argument'*

Presenter(s): Justin Rodriguez '27

Other Authors/Contributors: Cherlon Ussery (Professor of Linguistics, Carleton College), Daniel Groll (Chair of Philosophy, Professor of Philosophy, Carleton College)

When we say an organism is a member of a particular species, are we grasping a real category? One group of philosophers— 'realists'— argue "yes." Michael Thompson's transcendental argument is beloved by some realists, who argue that his sketch requires certain judgments about what an organism 'should' do, given the life-form it belongs to (e.g., the monarch butterfly should emerge from its larval process as an orange-and-black winged creature). These kinds of generalizations do provide a useful structure for our biological inquiries, but we might still question if they are rooted in anything real. In other writings, Thompson places life-forms among a set of intellectual tools that we carry with us into our inquiries. His case ultimately takes a Kantian shape, suggesting that life-forms are intellectual constructions we use to make sense of the world, but that they are ultimately creations, not things found in the natural world.

Poster #177

Title: *Sustainable Farming at Carleton's Student Organic Farm*

Presenter(s): Megan Roesler '26

Other Authors/Contributors: Maeve Clover '28, Edwin Pleitez Quintanilla '28, Daniel McGovern '26, Amanda Sames (Farm Manager, Carleton College)

As a Carleton Student Organic Farm intern, I had the chance to learn about sustainable farming by managing an organic farm of my own design with three other interns, guided by a farm manager with extensive farming experience. My responsibilities included attending meetings on sustainable agriculture, designing the farm's layout, planting, weeding, harvesting, and selling produce to Bon Appétit and Northfield community members via our weekly farm market stand. This year, the student

farm also committed to donating 10% of its produce to Carleton students as a means of combating food insecurity on campus.

This experience was funded by Environmental Studies Program at Carleton College

Poster #178

Title: *Fuisse Ferar: Power and Control in [Tibullus] 3.13*

Presenter(s): Zoe Roettger '27

Other Authors/Contributors: Clara Hardy (Chair of Classics, Professor of Classics, Carleton College), Cherlon Ussery (Professor of Linguistics, Carleton College), Ambar Galaviz '26, Juan Garcia Reyes '26, Justin Rodriguez '26, Jerry Shang '26, Eliana Simon '26, Sophia Ying '26, Hope

How does one engage in a practice that was not meant to accommodate them? This poster focuses on Sulpicia (late 1st century BCE), a female poet who wrote six love elegies during a period when female sexuality was increasingly restricted and regulated. Her poems fall into a sub-genre of Latin poetry called Roman elegy, whose counter-cultural conventions and tropes revolve around masculine authorship and experiences. I will examine her first elegy, [Tibullus] 3.13, and past scholarship on this poem in order to highlight the gendered literary and social power structures to which Sulpicia responds in her first work, namely pudor (shame, modesty) and fama (rumor, report, reputation). Moreover, I will demonstrate the ways in which she not only acknowledges but also circumvents these barriers to female authorship in Augustan Rome through her syntactical and semantic choices.

This experience was funded by Mellon Mays Undergraduate Fellowship

Poster #179

Title: *Summer Internship in Development at The John Howard Association*

Presenter(s): Andrew Rose '27

This summer, I interned in development and marketing at the John Howard Association in Chicago, Illinois. For over 100 years, John Howard has championed policy reforms and legislation that aim to help improve conditions inside state prisons across Illinois. My work this summer included both data work in John Howard's Chicago offices as well as site visits to prisons in southern Illinois where I got to be involved with John Howard's data collection efforts for their annual report. I was also privileged to attend events across many communities I in Chicago focused on reentry efforts for those impacted by the justice system and I was able to learn from their experiences to help center the work I was engaging in, in meaningful partnership. This summer I grew my personal skills in communication and non-for-profit development, as well as my skills in working with data and using data in public facing writing. I am

extremely grateful for the Barbara A. Will funds help with supporting me in my time with John Howard and for how meaningful a summer experience the internship was.

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

Poster #180

Title: *Teaching Shakespeare: Theater and Twelfth Night*

Presenter(s): Kaelyn Rothe '26, Jack Bartlett '27

Other Authors/Contributors: Andrew Carlson (Chair of Theater and Dance, Associate Professor of Theater, Carleton College), Lizzie Coy-Bjork '27, Caroline Stanton '27

We worked with the Great River Shakespeare Festival to run a series of programs for students aged 5-18 to develop acting techniques, learn to analyze Shakespeare's text, and practice improvisational skills, culminating in a performance of Shakespeare's Twelfth Night and several smaller Shakespeare-inspired plays for the younger actors.

Poster #181

Title: *Medieval Archaeology at a Rural Irish Castle*

Presenter(s): Calla James Ruff '27

I attended archaeology field school in County Roscommon, Ireland. I engaged in excavation, survey, and lab methods, contributing to research on medieval life and interactions between the Anglo Normans and Irish during the active lifetime of Ballintober Castle, from the late 13th century to the 17th century. This season, in the entrance to the castle, we worked through layers of fill, uncovered a drain, and extended the existing cutting to include the site of the moat beyond the entrance towers. There we found ecofacts such as nutshells and wooden posts, as well as artifacts including embossed and threaded leather.

This experience was funded by Nancy Wilkie Fellowship for Archaeological Field Experience

Poster #182

Title: *Methods of Ecological Restoration in Minnesota Prairies and Wetlands*

Presenter(s): Aviva Sachs '26

Sharing Our Roots is a 163-acre farm where former monocropped farmland has been transformed into agricultural, livestock, prairie, and wetland ecosystems. I worked under the supervision of Nic Nelson, the Natural Lands Manager. I was employed alongside two other interns from St. Olaf: Oslo Martin Risch and Alexander James. The goal of my internship was to support the existing ecological restoration programs at Sharing Our Roots through in-the-field restoration, native plant seed collecting, and native plant installations.

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

Poster #183

Title: *Aspartame contributes to tumor progression in hepatocellular carcinoma*

Presenter(s): Ayana Sakamoto '26

Aspartame, a widely used artificial sweetener, has raised concerns about its potential carcinogenic effects despite regulatory approval. This study examined the impact of aspartame on HepG2 human liver cancer cells, focusing on metabolic and gene expression changes. HepG2 cells exposed to aspartame showed significant upregulation of central carbon metabolism pathways, particularly the Warburg effect, which promotes biosynthesis and tumor growth. Gene upregulation and downregulation were assessed through transcriptomic analysis, revealing a dose-dependent relationship. These findings suggest that aspartame exposure may drive metabolic reprogramming associated with cancer cell proliferation.

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

Poster #184

Title: *Building Confidence and Connections Through Music Mentorship*

Presenter(s): Niko Sams '28

During my internship with WyattsMediaSchool, I combined creative practice with community engagement. I worked on music production projects, developed social media strategies to increase outreach, and mentored aspiring producers by teaching them how to create beats and express their ideas through music. This internship allowed me to strengthen my technical skills in production, deepen my understanding of mentorship as a tool for empowerment, and gain valuable experience in balancing

creativity with professional responsibilities. I also contributed to collaborative projects that helped expand the visibility of the program while providing a supportive environment for students. Overall, the experience enhanced my leadership, teaching, and networking abilities while confirming my commitment to building inclusive creative spaces.

This experience was funded by Class of 1970 Endowed Internship Fund

Poster #185

Title: *Phone-Based Promotion of Preventive Health Measures: Social Entrepreneurship in Colorectal Cancer Screening Outreach*

Presenter(s): Hermela Samuel '26

Supervisors and Institutional Affiliations: Olga Zerpa (Unity Healthcare)

My project focused on improving CRC screening rates in Wards 7 and 8. I designed and executed a Plan-Do-Study-Act (PDSA) cycle to evaluate the effectiveness of a phone-based intervention. My strategy for improving Unity's initiative was to reach out to those who had not completed a Fecal Immunochemical Test (FIT), an at-home, stool blood test for CRC. I promoted this innovative, and non-invasive method of CRC detection to patients who were skeptical about colonoscopies or facing barriers such as limited health literacy, transportation, or mental health challenges. I originally set out to raise the CRC screening rate at Unity's Anacostia clinic by 2% points by the end of August.

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

Poster #186

Title: *Supporting Geochronology Research with Mineral Separates*

Presenter(s): Ethan Saucedo '27

"The mineral separation laboratory performs crucial sample preparation work for a number of U.S. Geological Survey scientists and collaborators. As more emphasis is being placed on in situ, multivariate geochemical analyses, single crystal mass spectrometry remains a pivotal tool for geoscientists to better understand Earth and Earth processes. Mineral separations require time, effort, and skill to be performed correctly. With well established methods and a number of upcoming lab capabilities on the horizon, the Mineral Separation Laboratories will continue to provide the necessary support for our scientists internal and external to the U.S. Geological Survey." (Price, 2024)

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #187

Title: *Community Defense: My Internship At The Immigrant Law Center Of Minnesota*

Presenter(s): Luna Schindler-Payne '26

For my internship I worked along side the Community Defense Team at the Immigrant Law Center of Minnesota to provide legal representation for individuals in removal proceedings. I worked as a Spanish translator, interviewed clients, drafted motions and pleadings for court, and answered a phone line providing legal advice for individuals detained by ICE. The wide variety of work allowed me to quickly immerse myself in the day to day of immigration work. Beyond gaining foundational legal skills, I learned that I love legal work. I love how interesting I find case law, the fact that I get to interact with clients, lawyers, and collaborate to make the world a better place.

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

Poster #188

Title: *Computational Investigation of Silicon-Metal Cooperative Chemistry*

Presenter(s): Marie Schumacher '26

Other Authors/Contributors: Daniela Kohen (Professor of Chemistry, Carleton College), Matt Whited (Chair of Chemistry, Professory of Chemistry, Carleton College)

Supervisors and Institutional Affiliations: Daniela Kohen (Professor of Chemistry, Carleton College), Matt Whited (Chair of Chemistry, Professory of Chemistry, Carleton College)

The Whited group works with metal-metalloid complexes featuring silicon, a metalloid, double bonded to a transition metal. The Whited group has found that otherwise unstable silicon-metalloid bonds can be held together with a chelating ligand framework. In this framework, silicon and its bonded metal exhibit complementary reactivities that can be leveraged for catalysis, with silicon acting as electrophile and the metal behaving as nucleophile. The Whited group previously discovered that their complex can catalyze a reaction between a nitrogen-containing molecule and carbon monoxide to form an isocyanate, a compound with both nitrogen and carbon linked to oxygen. In this poster, we use computational methods to explore how chemical changes influence reactivity and catalysis.

This experience was funded by RUI: CAS-SC: Promoting Group-Transfer Reactions at Metal/Main-Group Bonds

Poster #189

Title: *Lower Middle Market Private Equity*

Presenter(s): Dash Schwab '27

This presentation explores key lessons from my internship at Augr Inc., supported by the Raymond Plank Chair in Economics Fellowship, where I gained firsthand experience in lower middle market private equity. My work spanned deal sourcing, due diligence, and portfolio company growth, offering a comprehensive view of the roll-up model in action. I will highlight the dual perspective I developed—evaluating whether an investment makes financial sense while also engaging in the operational execution needed to create post-acquisition value. From drafting government proposals and conducting market research to supporting the expansion of a security services portfolio company, I learned how strategy and execution intersect to drive results. These experiences not only strengthened my analytical and practical skills but also solidified my passion for business strategy and teamwork. Looking ahead, I will apply these insights to consulting at BCG, further exploring how businesses build, grow, and compete in dynamic markets.

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

Poster #190

Title: *UCSF PRISM Study and Diabetes Research*

Presenter(s): Nina Schwab '28

Cancer immunotherapy can lead to immune related adverse events (irAE's) like immune checkpoint inhibitor induced diabetes. Early detection of Diabetes can save lives and improve diabetes outcomes. The PRISM trial focuses on predicting the induced diabetes and monitoring patients to provide an earlier diagnosis.

This experience was funded by Trustee Endowed Internship Fund

Poster #191

Title: *Learning the Hard Way: Automated Curriculum Learning in Humans (and Machines)*

Presenter(s): Audrey Schwartz '26

Other Authors/Contributors: Annya Dahmani (University of California, Berkeley), Alison Gopnik (Professor of the Graduate School, University of California, Berkeley)

Supervisors and Institutional Affiliations: Annya Dahmani (University of California, Berkeley), Alison Gopnik (Professor of the Graduate School, University of California, Berkeley)

Curriculum learning is a strategy in which learners progress from simpler to more complex tasks, and automated curriculum learning (ACL) allows both humans and machines to sequence tasks based on competence. We studied children (5–7 years), adults, and reinforcement learning (RL) agents in a set of procedurally generated games varying in difficulty. Children demonstrated systematic curriculum design: they strategically stepped back to easier levels after failure and used their current competence to guide next-level choices, leading to significant improvement on challenging tasks. Adults, in contrast, showed less adaptive adjustment. RL agents trained with hand-designed curricula often diverged, but those augmented with competence-based auxiliary rewards solved target tasks efficiently and generalized across environments. Together, these findings highlight parallels between human and machine learning and point to new ways of designing adaptive curricula across both domains.

This experience was funded by Jackson and Warren Endowed Internship Fund

Poster #192

Title: *Examining the Emergence of Proto-National Consciousness Through the Literatus Yuan Haowen and His Poetry*

Presenter(s): Jerry Shang '26

Other Authors/Contributors: Seungjoo Yoon (Associate Professor of History, Carleton College)

The Mongol conquests in the 13th century were swift and ruthless- the destruction they left in the wake of their campaigns total and absolute, especially for those who dared to resist. For the literati who lived through this ordeal, including the literate Yuan Haowen, they witnessed what they believed to be the dissolution of their culture. I argue that developments within the literati class during the Jin dynasty, catalyzed by the wholesale destruction of the Jin and the imposition of foreign rule revealed an emerging proto-national consciousness evident in Yuan's poems and his efforts to compile his Anthology of the Central Plains. This consciousness encompasses a cultural and historical consciousness rooted in a civilizational order of the Central Plains. Central to my argument will be the poems composed by Yuan during his journey crossing the Fen River, as it parallels a literary journey that illuminates important intellectual and cultural developments.

This experience was funded by Mellon Mays Undergraduate Fellowship

Poster #193

Title: *Building Community Through STEM*

Presenter(s): Ma'Ki Shaw '27

During my summer internship as a Generation Teach Fellow in Boston, I taught academic and enrichment courses to middle school students while developing key instructional and leadership skills. I completed an intensive training program focused on community building and pedagogy, then designed and delivered daily environmental engineering lessons alongside enrichment activities. Through consistent coaching, I strengthened my instructional communication and learned to translate complex concepts into engaging, age-appropriate lessons. This experience confirmed my passion for STEM mentorship and reinforced my long-term goal of integrating physics expertise with education and outreach.

This experience was funded by Nini's Endowed Internship Fund

Poster #194

Title: *Youth and the Future of Culture at the Smithsonian Center for Folklife and Cultural Heritage*

Presenter(s): Joella Shearer '26

As a Folklife Storytellers Workshop Intern at the Smithsonian Center for Folklife and Cultural Heritage, I have worked on a variety of multimedia projects documenting the Center's annual Folklife Festival and highlighting its stories. My cohort, which consists of students on film/video and writing tracks, is in the process of producing a series of magazine articles, a podcast series, and a feature length documentary about this year's Festival. Given that I am film major, my primary role has been editing the documentary film. As part of this film work, myself and other members of my cohort filmed the events of the Festival, conducted onsite interviews with Festival participants and in-office interviews with CFCH curators and staff, and catalogued the 9,000+ video files.

Poster #195

Title: *Game Development Summer Internship at SayKid*

Presenter(s): Rui Shen '26

During my internship at SayKid, I was responsible for creating developmentally appropriate games for children aged 4 to 11 and older. The games I developed included a variation of "Guess Who" designed to help kids improve their observation and logical thinking skills, as well as a LLM-free conversation-based game that encouraged children to ask and answer questions across a variety of topics.

This experience was funded by Solhem Business Fellowship Fund

Poster #196

Title: *Creating Structure-Guided Mutants in the Sec8 and Sec15 Subunits of the Exocyst*

Presenter(s): Sarah Shi '26

Other Authors/Contributors: Patrick Brennwald (Professor, UNC Chapel Hill), Guendalina Rossi (Assistant Professor, UNC Chapel Hill), Rick Baker (Assistant Professor, UNC Chapel Hill), Gabrielle Puller (Doctoral student, UNC Chapel Hill), Sarah Shi '26

Created structure-guided mutations in the Sec8 and Sec15 interfaces of the exocyst subunit to further elucidate how this interface contributes to exocyst activation.

This experience was funded by Waterbury Endowed Internship Fund

Poster #197

Title: *Testing the Effects of Electronic Cigarette Flavor Chemicals on Reward and Reinforcement*

Presenter(s): Ronen Silberman '27

We investigated the effects of neuroactive vape flavor chemical hexyl acetate (HA), compared to neuroinactive chemical ethyl acetate (EA) on dopamine transmission, reward processing, and vape use. We did so using a randomized, double-blind controlled trial in which 36 regular nicotine users completed laboratory tasks and underwent fMRI brain scans before and after a 10-day HA/EA use period. Outcomes were measured using the RRVT (Relative Reinforcing Value Task), MID (Monetary Incentive Delay) task, subjective vape ratings, and puff counts over the 10-day span.

This study provided proof of concept that neuroactive flavor chemicals in e-cigarettes can influence behaviors, potentially through reward processing in the brain. We saw real-world evidence that neuroactive HA increased vape use, but this finding was not supported by the laboratory behavioral tasks.

This experience was funded Wiebolt Endowed Internship Fund

Poster #198

Title: *The Myth of Bangladeshi Independence in the Short Fiction of Mahasweta Devi and Hasan Azizul Huq*

Presenter(s): Eliana Simon '26

Other Authors/Contributors: Amna Khalid (Director of Asian Studies, Professor of History, Carleton College), Cherlon Ussery (Professor of Linguistics, Carleton College)

Supervisors and Institutional Affiliations: Amna Khalid (Director of Asian Studies, Professor of History, Carleton College) and Cherlon Ussery (Professor of Linguistics, Carleton College)

This poster examines how literary fiction functions as a counterarchive for understanding marginalized experiences during the 1971 Bangladesh Liberation War. While dominant Bengali nationalist narratives frame 1971 as a heroic liberation story, they systematically erase the perspectives of peasants, women, and tribal communities whose oppression persisted after independence. Through close analysis of Hasan Azizul Huq's "Through Death and Life" and Mahasweta Devi's "Douloti the Bountiful," I demonstrate how these authors reveal the continuity of exploitation structures across regime changes. Huq depicts landless peasants trapped in feudal dispossession, while Devi exposes debt bondage and sexual commodification of Adivasi women. Both stories challenge the assumption that political independence constituted genuine liberation for South Asia's most vulnerable populations. These works recover suppressed histories and compel us to critically consider decolonization's incomplete promises, revealing how class hierarchies, caste exploitation, and gendered violence remained intact beneath new flags of sovereignty.

This experience was funded by Mellon Mays Undergraduate Fellowship

Poster #199

Title: *The 77th Japan-America Student Conference*

Presenter(s): Samir Singh '28

This summer, I served as an American delegate in the 77th annual Japan-America Student Conference. Each year, the conference brings together an equal number of university students from the United States and Japan (this year was 28 from each side) who spend a month traveling together across the host country. The ultimate aim of the conference is to promote peace by furthering mutual understanding, friendship, and trust through international student exchange. This year, delegates visited Kyoto, Osaka, Kumamoto, and Tokyo. At each site, we met with academics and local leaders, performed acts of public service, and studied topics of bilateral and global interest. Highlights of the experience included conversing and participating in workshops with diplomats and ambassadors, governors, CEOs, and members of the Imperial Family. The conference was divided into seven smaller roundtables, each focusing on a specific topic; my roundtable was Japan-U.S. Business Strategies.

This experience was funded by Raymond Plank Chair in Incentive Economics Funding for Internships and Donald A. Camp '70 and Elizabeth Hart Camp Endowed Internship Fund

Poster #200

Title: *Two-Compartment Population Pharmacokinetic Database for Antibodies and Antibody-Drug Conjugates (ADCs)*

Presenter(s): Ryan Soli '28

I created a database holding 2-compartment pharmacokinetic parameters for over 100 unique antibodies and ADCs from nearly 200 papers and hundreds of studies. It's filterable by many variables and descriptive statistics were found. The database was approved by a group of end-use modelers. In addition, I also did pharmacokinetic modeling work with the use of WebPlotDigitizer v4 and the Microsoft Excel Solver using graphs and data from published work.

Poster #201

Title: *Construction of Gut Microbiome Genomic Libraries via TFUM seq in RAW264.7 Macrophages*

Presenter(s): Christina Song '28

Other Authors/Contributors: Angel Solis (Assistant Professor of Biology, Carleton College)

Supervisors and Institutional Affiliations: Angel Solis (Assistant Professor of Biology, Carleton College)

The human gut microbiome is a dense and diverse ecosystem that plays a central role in immune development and regulation. Advances in sequencing and bioinformatics have significantly expanded our ability to characterize microbial composition and predict functional potential. Yet, nearly 70% of the microbiome genetic capacity remains uncharacterized “dark matter,” limiting our ability to move beyond correlations to mechanistic understanding. This knowledge gap is especially critical for immune detection, where host responses are shaped by specific microbial gene products and metabolites. Dysbiosis of the gut microbiome has been associated with a wide range of conditions, including inflammatory bowel disease, autoimmune disorders, metabolic syndrome, colon cancer, and neurodevelopmental disorders. Functional metagenomics addresses this challenge by cloning and expressing environmental DNA in heterologous hosts, enabling the direct discovery of microbial genes involved in immune modulation, inflammation control, and mucosal barrier protection.

Poster #202

Title: *Neutrophil Elastase Release Stimulated by Uranium-Bearing Mine Dust Exposure*

Presenter(s): Varinn Sood '29

The Southwestern U.S. contains thousands of abandoned uranium mines, many in the Four Corners region near rural Hispanic and Native American communities. Legacy mines, such as Jackpile and St. Anthony in New Mexico, release uranium-bearing dust (UBD) that may cause chronic inflammatory diseases affecting the pulmonary, cardiovascular, renal, and autoimmune systems. We hypothesize that UBD stimulates neutrophils, either directly or through cytokine-rich supernatants from exposed macrophages, leading to increased neutrophil elastase release (NER). To test this, HL-60 promyelocyte-derived neutrophils and THP-1 macrophages were exposed to 100 µg/mL of UBD from Jackpile, St. Anthony, or Colorado Red mine dust (control). Macrophage supernatants were collected after 48 hours, and neutrophils were stimulated either directly with mine dust or indirectly with supernatants. ELISA NETosis Assay showed NER increased with direct dust exposure, while indirect exposure produced lower NER, possibly due to elevated baseline from HL-60 media. Future studies should refine macrophage controls.

Poster #203

Title: *Cell cycle genes regulate sexually dimorphic neuron development in *Caenorhabditis elegans**

Presenter(s): Ruby Spector '26

Other Authors/Contributors: Annelisa Smith '27, Jennifer Ross Wolff (Director of the Perlman Center for Learning and Teaching & Humphrey Doermann Professor of Liberal Learning, Professor of Biology, Carleton College), Andrea Kalis (Senior Lecturer and Lab Coordinator in Biology) Car

Supervisors and Institutional Affiliations: Jennifer Ross Wolff (Director of the Perlman Center for Learning and Teaching & Humphrey Doermann Professor of Liberal Learning, Professor of Biology, Carleton College), Andrea Kalis (Senior Lecturer and Lab Coordinator in Biology) Carleton College

Cell-cycle regulating genes play a role in the development of sex specific ventral cord neurons in *C. elegans*. *C. elegans* exist as two sexually dimorphic sexes: males and hermaphrodites. Ventral cord neurons derived from the P lineage are an example of sex specific neurons. In hermaphrodites VC neurons modulate egg-laying and in the males CA and CP neurons along the ventral nerve cord regulate sperm transfer and sexual movement. To investigate the development of these neurons, RNA interference was used to knockdown cell-cycle activating and inhibiting genes in *nre-1*, *lin-15b* sensitized background. Expression of *ida-1::gfp* and *tph-1::mcherry* was then observed in the ventral nerve cord of hermaphrodites and males treated with RNAi. This project is ongoing. Next steps include investigating additional cell-cycle regulating genes and employing temperature sensitive mutants to further investigate developmental timing.

Poster #204

Title: *Learning About Video Marketing*

Presenter(s): Liliana Speiser '28

Though SayKid frequently takes on game development interns, I served as the company's first marketing intern. Since I started the summer with no knowledge about marketing strategy, I first studied product teasers in EdTech and other categories to gain inspiration, and detect trends to build a framework for elements that made them successful. After building an understanding of SayKid's brand, target audience, and mission, I experimented with CapCut to make a couple of 30-second videos using the company's content library. I built my videos using only prerecorded content, which proved challenging as I had less creative control, but I had to be more creative to shape the content to fit my vision. Ultimately, I produced and edited a long-form teaser video for the ToyBot's Amazon launch.

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

Poster #205

Title: *"All The World's A Stage" - Teaching At the Great River Shakespeare Festival In Winona Minnesota*

Presenter(s): Caroline Stanton '27, Lizzie Coy-Bjork '27

Other Authors/Contributors: Andrew Carlson (Associate Professor of Theater, Chair of Theater and Dance)

We were education interns at the Great River Shakespeare Festival in Winona Minnesota. This is the largest equity theater outside of the Twin Cities in Minnesota! Over one month we worked with three groups of students ages 4-18, with each group culminating in a performance of a Shakespeare or Shakespeare-inspired work. The primary group we worked with was Shakespeare for Young Actors (SYA), who are ages 12-18, on their production of Twelfth Night. We worked alongside Andrew Carlson and several professional actors and company members to make this program a success.

This experience was funded by Project '60 Endowed Internship Fund.

Poster #206

Title: *Social Change through Labor Organizing*

Presenter(s): Iris Steiner-Manning '26

This summer I had the incredible opportunity to participate in the Colorado College Social Action Institute. Through this program, I was able to both deepen my academic engagement with social change and explore how I can shape my career around it. Through the Social Action Institute, I was placed at an internship with SEIU Local 105. At the labor union, I worked with the external healthcare department, engaging in organizing campaigns at small clinics, homeless shelters, and home health care workers. My internship capstone was a worker storytelling zine centered around a unionization campaign for home health care workers.

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

Poster #207

Title: *Expression of Hydroxylases Involved in Bleomycin Biosynthesis*

Presenter(s): Naomi Straub '26, Cameron O'Connor '27

Other Authors/Contributors: Chris Calderone (Associate Professor of Chemistry and Director of Biochemistry, Carleton College), Maddie Selinger '28

Supervisors and Institutional Affiliations: Chris Calderone (Director of Biochemistry, Associate Professor of Chemistry and Carleton College)

The compound bleomycin, an important antitumor agent, is synthesized in the bacterium *S. verticillus* by a chain of enzymes that incorporate various amino acids into the final product.¹ In particular, two of these amino acids exist in modified states: β -hydroxyasparagine and β -hydroxyhistidine. The mechanism for these hydroxylations is relatively unknown, meaning the determination of the enzymes involved in this reaction would have both biochemical and pharmaceutical importance. Two proteins, ORF15 and SyrP2, were identified as potential candidates for catalyzing this reaction due to their similarity to proteins in the non-heme iron hydroxylase family. In order to verify this prediction, SyrP2 and ORF15 were expressed and purified.

This experience was funded by Elliott Uhlenhopp Endowed Fund for Student & Faculty Research in Chemistry, Professor Jerry Mohrig Endowed Fund for Student-Faculty Research

Poster #208

Title: *The Letters They Kept: Left-behind Wives and the Archive of Separation*

Presenter(s): Sunny Sun '26

Other Authors/Contributors: Cheryl Yin (Assistant Professor of Anthropology, Carleton College)

Supervisors and Institutional Affiliations: Cheryl Yin (Assistant Professor of Anthropology, Carleton College)

In the early 20th century, many Chinese men from southern China migrated to Southeast Asia in search of economic opportunities, leaving wives and families behind to manage households. While migration from this period has been extensively studied, the perspectives of left-behind families remain underexplored. Drawing on archival research conducted at universities and libraries in Haikou, Hainan, and ethnographic fieldwork in two villages in Wenchang, Hainan, this study examines the lived experiences of left-behind wives. Through their experiences, we explore how transnational migration shaped kinship structures, community norms, and family dynamics in modernizing China.

This experience was funded by Joan Hanson Endowed Fund for Faculty Development and teaching in Ethics

Poster #209

Title: *A Colorimetric Assay for Alanyl-tRNA Synthetase Activity*

Presenter(s): Madeline Tabora '26

Other Authors/Contributors: Joe Chihade (Professor of Chemistry, Carleton College)

Supervisors and Institutional Affiliations: Joe Chihade (Professor of Chemistry, Carleton College)

Aminoacyl-tRNA synthetases (AaRSs) are the enzymes that attach amino acids to their corresponding tRNAs. These enzymes work with proofreading factors that hydrolyze mischarged tRNAs, recycling the tRNA and the amino acid. Specifically, I worked with E. coli alanyl-tRNA synthetase (AlaRS), a deacylase called MCP3 from T. brucei, and E.coli tRNA-Ala. I expressed and purified these components to use in vitro aminoacylation and deacylation assays, using both radiolabeled substrates and a CAS-Fe³⁺ colorimetric assay to track reaction progress. I worked to optimize these assays to provide a cheaper, simpler method of measuring enzyme activity, exploring tRNA recycling, and investigating quality-control mechanisms that safeguard protein synthesis.

Poster #210

Title: *Creation of a Thermosensitive Hydrogel*

Presenter(s): Will Tan '27

Throughout the summer, I worked on creating a gel using a compound called citral, which has both antibacterial and anti-inflammatory properties. Citral itself is insoluble, so using knowledge from past research and work I had done with the chemistry department at Carleton, my coworkers and I created a host-guest equilibrium system using cyclodextrin (β -CD). Cyclodextrin, which is larger than citral, is inherently soluble, so by trapping citral molecules inside cyclodextrin, we created an overall complex that is soluble. After testing and optimizing our host-guest complex, we utilized it to research and develop a heat-sensitive water-based gel that incorporates chitosan, a compound that accelerates wound healing.

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

Poster #212

Title: *Supporting Migrant Education in Shanghai: My Stepping Stones Internship*

Presenter(s): Jenny Tang '28

In my internship, I served as a School Videolink Program for Stepping Stones China, a non profit organization based in Shanghai, China dedicated to provide educational opportunities for financially disadvantaged migrant students. English is the subject that poses the most challenges to under-served children, due to inadequate resources. Stepping Stones aims to improve their confidence in English as a second language. As a School Videolink Program Intern, I managed online classes for over hundreds of migrant students, ensuring smooth program delivery by overseeing student progress, troubleshooting technical issues, and leading communication between volunteers, parents, and students. I participated in offline social and talk sessions as a 'student' to learn more about Chinese volunteer experiences, and had training and meetings with my colleagues and supervisor. Throughout these three months, my colleagues and I have successfully contributed to the completion of lessons in over a hundred English and Phonics classes.

This experience was funded by Abeona Endowed Fund for International Internships

Poster #211

Title: *Mitochondrial Lactate Import via MCT1 Supports Carbohydrate Oxidation in the Absence of MPC*

Presenter(s): Irene Tang '26

The oxidation of carbohydrate-derived substrates is essential for maintaining human heart metabolism. Pyruvate import into mitochondria has been attributed to the mitochondrial pyruvate carrier (MPC), however, recent evidence from the Ducker lab suggests that alternative pathways may occur independently of MPC. Our lab found that monocarboxylate transporter 1 (MCT1) is also localized to the inner mitochondrial membrane of cardiomyocytes and is likely essential for the mitochondrial import and oxidation of lactate. We aim to define the role MPC and MCT1 in mitochondrial carbohydrate oxidation using a tamoxifen-inducible, cardiomyocyte-specific knockout mouse models. By performing stable isotope tracing with [U-13C]glucose and [U-13C]lactate and analyzing cardiac tissues via liquid chromatography–mass spectrometry (LC-MS), prior work from our lab has shown that deletion of MPC1 alone does not impair TCA cycle labeling from glucose or lactate, possibly due to compensation by MCT1 mediated mitochondrial lactate oxidation. Further experiments will clarify the transporters' function and the specific metabolic pathways involved in the hope of giving insight to new therapeutic targets in heart failure and other metabolic disorders.

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

Poster #213

Title: *Investigating Orchid Germination Through Fungi and Media Trials*

Presenter(s): Misaki Taniguchi '26

Orchids (Orchidaceae) are one of the most diverse flowering families of plants and have unique strategies for germination, requiring fungi to provide nutrients. However, many of them are endangered or going extinct in part due to their specific needs, climate change, and poaching. Currently, orchid germination is difficult due to the lack of information on their niche requirements. We ran germination trials to determine orchid germination rates based on different media and fungi. Our preliminary results suggest that V895 media promotes higher germination rate, while P723 and K425 media promote higher meristem development.

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

Poster #214

Title: *Hennepin County Public Defender's Internship*

Presenter(s): Lola Taraday '26

Supported by the Jean Phillips Memorial Internship Fund, I completed a summer internship at the Hennepin County Public Defender's Office in Minneapolis, MN. My work focused on two key areas: investigative work and attorney shadowing. In my investigative role, I reviewed jail calls, body camera footage, and victim statements to identify information relevant to client cases. Through shadowing my mentor attorney, I observed court proceedings and interacted with both in-custody and out-of-custody clients during trials and jail visits. This experience gave me a deeper understanding of the vital role public defenders play in the criminal justice system, as well as the process of gathering evidence and building a defense. Inspired by this internship, I plan to pursue a career in law, with the goal of becoming a public defender.

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #215

Title: *Project Management at Bloom Projects*

Presenter(s): Wilson Taraday '28

I focused intensively on several key development projects, notably the University of Washington's Institute for Protein Design and The Bush Middle Schools make-ready for construction project (some details of these projects are still confidential as they have not been fully completed). For the UW IPD project, I attended every site walk, took progress photos, and helped correct contractor invoices for the budget spreadsheet. For the BMS project, I attended every site walk, inspection, and took detailed notes for the weekly Owners, Architect, and Contractor (OAC) meetings. To conclude my time at Bloom Projects, I created a BMS case study as part of a company advertisement and presented to the entire team about HVAC construction details of the BMS project.

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

Poster #216

Title: *Accessible Bacterial Motility Tracking and PFU/CFU Identification*

Presenter(s): Bobby Targ '26

Supervisors and Institutional Affiliations: Paul Turner (Rachel Carson Professor of Ecology and Evolutionary Biology, Yale Medical School), Jyot Antani (Postdoc in Ecology and Evolutionary Biology,

Yale Medical School), Paul Bollyky (Professor of Medicine and Microbiology and Immunology, Stanford M

Python package tracking many kinds of bacterial movement with accessible UI and no paid license. Free and accessible PFU/CFU counting app with no learning curve to use and more-than-competitive statistics.

This experience was funded by Trustee Humanities Endowed Student Research Fund

Poster #217

Title: *The Carleton Guide to Medieval Rome*

Presenter(s): Julia Tassava '26, Ella Parke '27, Sam Jackson '27, Tim Abbott '26

Other Authors/Contributors: Victoria Morse (Chair of History, Professor of History, Program Director of Medieval and Renaissance Studies, Carleton College), Austin Mason (Assistant Director for Digital Humanities, Director of Digital Arts and Humanities. Senior Lecturer in History,

Supervisors and Institutional Affiliations: Victoria Morse (Chair of History, Program Director of Medieval and Renaissance Studies, Professor of History, Carleton College)

The Carleton Guide to Medieval Rome summer research, led by Professor Morse, focused on refining the CGMR website using our recent knowledge from studying abroad in Rome during the spring. Our intention with the project was to make the website accessible to people with limited knowledge of medieval Rome. Furthermore, we edited walking routes and the amount of information on the website to make them more realistic. Our methods of research were dividing up parts of the CGMR to each worker so that we could cover the most ground. We then worked on editing grammar, information, and assessing if the topic was necessary. What we discovered was that overall, the CGMR website had quite a good amount of information, but we needed to reshape how the website looked so that it became less complicated.

This experience was funded by Trustee Humanities Endowed Student Research Fund

Poster #218

Title: *Liberty and Justice for All: Exonerating the Justice System at GNIP*

Presenter(s): Fatima Taylor-Kamara '26

This summer, I interned with the Great North Innocence Project (GNIP) through the support of the Jean Phillips Memorial Internship Fund. My work focused on projects central to GNIP's mission of exonerating the innocent and addressing wrongful convictions. I conducted legal research to identify potential

evidence of innocence, digitized over 25 boxes of case files for long-term accessibility, and reviewed hundreds of pages of police reports and testimonies to summarize key insights in an ongoing case. Beyond these tasks, I witnessed the pardon of Sherman Townsend by the Minnesota Pardon Board. This experience underscored both the law's capacity for harm and its potential for restoration. I also shadowed state and federal judges, broadening my understanding of judicial perspectives. This internship strengthened my commitment to pursuing a career in law and taught me the importance of striking a balance between empathy and objectivity in the pursuit of justice.

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #219

Title: *Fire-induced mass flowering allows rattlesnake master (*Eryngium yuccifolium*) to evade pre-dispersal seed predation by moth (*Coleotechnites eryngiella*) larvae in an Iowa prairie remnant*

Presenter(s): Perri Thompson '26, Ava McQuain '27

Other Authors/Contributors: Ryan Yang '27, Lily Johnson '27, Mark McKone (Towsley Professor of Biology & Research Supervisor of Cowling Arboretum, Carleton College)

Supervisors and Institutional Affiliations: Mark McKone (Towsley Professor of Biology & Research Supervisor of Cowling Arboretum, Carleton College)

Mass synchronous flowering (masting) is hypothesized to offer an escape from seed predation due to predator satiation. We tested this hypothesis in the prairie forb *Eryngium yuccifolium*, which is frequently attacked by larvae of the specialist pre-dispersal seed predator *Coleotechnites eryngiella* (Lepidoptera). Because fire induces mast flowering in *E. yuccifolium*, we compared burned and unburned sites in 2025 in Hayden Prairie, Iowa. Density of inflorescences was ~10X greater in the burned site. Insect damage was assayed visually on each plant's largest inflorescence. The unburned site had significantly more damage (averaging between 25 and 50% of flowers damaged) compared to the burned site (averaging well less than 25% of flowers damaged). The 2025 burn site was not burned in 2024, and that year had insect damage rates at higher levels that were comparable to the 2025 unburned site. The lower observed predation in burned plots supports masting as a seed-predation defense.

This experience was funded by William and Elizabeth Muir Endowed Fund

Poster #220

Title: *International Law In Singapore and Sichuan*

Presenter(s): Theo Tirschwell '27

This project reflects on my internship at the National University of Singapore's Centre for International Law, supported by the Jean Phillips Memorial Internship Fund. My research focused on how states comply, or resist complying, with international arbitration awards, requiring close analysis of complex legal cases and evolving jurisprudence. Through this work, I developed key skills in distinguishing fact from legal reasoning and synthesizing dense material into accessible insights. A highlight of the summer was traveling with my professor to Chengdu, China, to assist in teaching at Sichuan University and engage with students on law and politics in a Chinese context. Collaborating with colleagues from five continents deepened my appreciation for how international law operates through diverse human perspectives. This experience strengthened my commitment to pursuing a career at the intersection of law, policy, and global understanding.

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #221

Title: *From Carleton to Congress: Interning on the Hill*

Presenter(s): Tripp Tokioka '26

This summer, I interned for the office of Ed Case, one of Hawaii's two congressmen. I entered the office at a chaotic time, and most of our office priorities focused on how to keep Hawaii relevant on the federal level as well as how America could handle increased aggression from China. My unique responsibilities as an intern involved evaluating introduced bills and giving them a recommendation for or against sponsorship.

Finally, I researched constituent survey data and brainstormed ways to improve district outreach and constituent interactions, particularly regarding state leadership in response to the Trump administration.

This experience was funded by Multicultural Alumni Network (MCAN) Fellows Program

Poster #222

Title: *Sodium Ion Battery Development*

Presenter(s): Alison Trackman '26

This summer, I worked at Mana, a small start-up company in Boulder, Colorado founded out of the University of Colorado Boulder. Mana produces an anode-free sodium-ion battery cell platform, including proprietary high energy cells and liquid electrolyte. I contributed to two projects: the first was to develop test protocols and analysis scripts for rate testing of battery cells, and the second was to produce high quality anodes for a customer project. I developed skills working with a small team, troubleshooting electrode builds, and python coding for data analysis.

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

Poster #223

Title: *Learn by Play with Automated Logic Game Generation*

Presenter(s): Cuong Tran '26

This is a Game Design Internship provided by SayKid. During the internship, we updated old games before focusing on my main project of making a logic puzzle game. Similar to many other SayKid games, it'll be presented in the form of a plush toy conducting the game with a physical board through Alexa voice technology, and doesn't involve the usage of any screen.

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

Poster #224

Title: *Empowering Pediatric Cancer Research in the Cloud*

Presenter(s): Daya Tucker '27

I worked with the Cloud Applications Team in Research Information Services, building cloud tools that support collaboration and progress in pediatric cancer research. I helped develop a feature that transforms portal data on tumor samples into standardized PDFs, consolidating complex research information into a single, easily shareable document and streamlining how researchers access and review critical data.

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

Poster #225

Title: *Ultracold Atomic Physics at UT Austin*

Presenter(s): Hays Turner '27

Supervisors and Institutional Affiliations: Daniel Heinzen (Professor of Physics, University of Texas at Austin)

This summer research focuses on the recommissioning of an ultracold lithium atom beam for applications in atom lithography, few-body collision studies, and precision measurement experiments. The beam achieves a temperature of 7 ± 3 milliKelvin with an atomic flux comparable to the most intense cold atom sources produced by other methods. Personal contributions to the project include: redesigning and repairing components of a Michelson wavemeter using CAD to enable reliable tuning and stabilization of an external cavity diode laser (ECDL); testing and operating cryogenic and vacuum systems; optimizing laser detection setups; and analyzing lithium fluorescence and hyperfine transition data from a test beam. Although the experiment is not yet fully operational, improvements to the vacuum system design are expected to enable the realization of the highest-flux cold atom source yet demonstrated by any method.

This experience was funded by Class of 1964 Endowed Internship Fund

Poster #226

Title: *Characterizing Forest Response Pathways in the Blackwater National Wildlife Refuge*

Presenter(s): Sara Typrin '26

Other Authors/Contributors: Kayla Marie Preisler (Graduate Student, University of Arizona), Brandon Alvshere (Postdoctoral Fellow, Virginia Commonwealth University), Lisa Haber (Postdoctoral Research Fellow, Virginia Commonwealth University), Chris Gough (Executive Director of Rice

Supervisors and Institutional Affiliations: Sara Typrin, Kayla Marie Preisler (Graduate Student, University of Arizona), Brandon Alvshere (Postdoctoral Fellow, Virginia Commonwealth University), Lisa Haber (Postdoctoral Research Fellow), Chris Gough (Executive Director of Rice River Center, Virgin

Coastal forests at the Chesapeake Bay margin are rapidly transforming due to sea level rise and acute overwash events driven by extreme storms. This study examines forest response pathways in Maryland's Blackwater National Wildlife Refuge region, an area undergoing drastic forest loss due to saltwater intrusion. Using Landsat 8 satellite imagery to extract vegetation indices, I calculated time series metrics that allowed me to identify which forested areas are undergoing transformations, and which areas are stable or in recovery. I compared forest response pathways geographically and by elevation, and found that more abrupt and gradual changes occur closer to the west coast region and at lower elevations. This work can help inform adaptation strategies and land management techniques.

This experience was funded by Student Airborne Research Program (SARP), NASA Earth Science Division

Poster #227

Title: *Thermal Properties of Basement Rocks: Effects of Deformation and Texture from 25-1000°C*

Presenter(s): Evan Umbreit '26

Supervisors and Institutional Affiliations: Alan Whittington (Professor of Geology, University of Texas San Antonio), Kurtis Burmeister (Professor of Geology, California State University)

Understanding geothermal gradients is essential for accurate subsurface modeling as they – along with mineralogy – control the rheological properties of the mid-lower crust. Therefore, developing an accurate model of the thermal properties of the basement is essential as they determine the local geothermal gradient. However, thermal properties are impossible to observe directly at depth and therefore must be characterized through laboratory testing. Here we examine how the deformation and texture of gneiss and amphibolite sampled from exposures of the Proterozoic basement of the Sveconorwegian orogen in southeastern Norway affect the thermal diffusivity (D), thermal conductivity (k), and heat capacity (C) from 25°C to Moho temperature and beyond.

We measure the heat capacity and thermal diffusivity using laser-flash analysis, while the thermal conductivity is calculated with the formula $k = D\rho C$, where ρ is density. Density is measured by a helium pycnometer. Current results show a range for D of 0.9-2.1 mm²/s at 25°C, 0.6-1.0 mm²/s at 300°C, and 0.3-0.5 mm²/s at 1000 °C while k ranges 2.5-4.8 W/(m*K) at 25°C, 1.7-3.2 W/(m*K) at 300°C, and . For an individual sample, D decreases by ~35-50% from 25°C to 300°C and by ~60-70% from 25 °C to 1000 °C, showing high variation even in similar samples. Thermal diffusivity at room temperature is highest in the most quartz-rich lithologies, and these also show the greatest decrease in D on heating. Most samples do not retain their original D after heating, with larger drops usually occurring in more deformed samples, potentially due to microcracking. We observe the most dramatic change in D in a well-foliated augen gneiss, where D dropped from 1.38 mm²/s to 1.09 mm²/s. We theorize the drop could be caused by the smaller grain size observed in the more deformed samples, or by the presence of hydrous minerals, which can explode when heated at the surface, but not at depth in the crust. However, further investigation must be carried out to find the true cause of this drop and the exact temperature it occurs at.

This experience was funded by Rosenheim Environmental Internship Fund, M. Leith Shackel Internship Endowment Fund

Poster #228

Title: *Inhalable Micro- and Nano-Plastic Particles 2: Influence of Meteorological Conditions on Polystyrene Observations*

Presenter(s): Maja Urban '27

Other Authors/Contributors: Maryjane A. Iteghete '28, Frankie L. Saraniti '25, and Deborah Gross (Charles "Jim" and Marjorie Kade Professor of the Sciences, Professor of Chemistry, Carleton College)

Supervisors and Institutional Affiliations: Deborah Gross (Charles "Jim" and Marjorie Kade Professor of the Sciences, Professor of Chemistry, Carleton College)

Micro- and Nano-plastic particles (MNPPs) are small pollutants (1 μ m-5mm and <1000 nm, respectively) made of synthetic polymers. Although they have been found all over the globe, in water, soil, air, and living creatures, atmospheric MNPPs were first reported in Paris in 2015. Using single particle mass spectrometry of polystyrene latex spheres as a standard, we looked for polystyrene in aerosol composition data from 2002-2014. We identified polystyrene in ambient air in five urban and suburban locations (Atlanta, East St. Louis, Milwaukee, Barcelona, and Northfield), but noted its absence in two remote locations (Yellowstone and Abisko). We compared the polystyrene we observed to total particles sampled, wind speed, and wind direction.

This experience was funded by Climate Solutions Fund of Carleton College, Summer Science Fellows Program

Poster #229

Title: *Investigating Alterations in Brain Functional Connectivity in Tourette Syndrome Using REACT with the 5-HTT Atlas*

Presenter(s): Charlotte Vadnais '27

Gilles de la Tourette syndrome is a childhood-onset neurodevelopmental condition categorized as the chronic persistence of both motor and vocal tics. Both the dopaminergic and GABAergic systems are well-established to be responsible for tics due to the fact that these involuntary actions present due to dysfunction of movement inhibition. While less studied and with mixed results, the serotonergic system may also play a role. In this longitudinal study, the novel imaging technique "REACT" (Receptor-Enriched Analysis of Functional Connectivity by Targets) was used to examine serotonin-modulated functional connectivity in the brains of Tourette's patients versus those of healthy controls to further explore the potential moderating role of serotonin.

This experience was funded by Abeona Endowed Fund for International Internships

Poster #230

Title: *Suppression of Toxoplasma gondii in neuronal stem cells through the use of a novel anti-parasitic drug*

Presenter(s): Fernando Valdes Nicholson '28

Supervisors and Institutional Affiliations: Rima McLeod (University of Chicago, Toxoplasmosis Center)

Toxoplasma gondii is a common apicomplexan parasite which currently infects approximately one third of the world's population, making it the most common zoonotic disease in the world. Although clinically irrelevant to the majority of immunocompetent people, chronic toxoplasmosis has long been suspected to cause neurological diseases such as Alzheimer's Disease and schizophrenia. In order to understand this relationship, we cultured and infected neuronal stem cells with two different cyst-forming strains of T. gondii to see if in vivo pathology was maintained. We also treated the neuronal stem cells with JAG21, a novel drug which has been shown to reduce parasite count in other tissue types. We found the pathology was consistent with standard in vitro and in vivo samples, and that JAG21 significantly reduced parasite and cyst load. Future analysis involving these cells will involve looking for Alzheimer's phenotypes in NSCs as well as within cerebral brain organoids.

This experience was funded by Robert J. Kolenkow and Robert A. Reitz Endowed Fund for Student Scientific Research

Poster #231

Title: *Competency Unit: The Role of Advocacy in Public Defense*

Presenter(s): Claudette Valencia '26

I returned to the County of San Diego Office of the Public Defender interning in the competency unit. We assist in cases that help determine whether a client needs an evaluation to ensure they understand the charges and can participate in their trial. One case involving a client with dementia reminded me of my time working with elderly residents in nursing homes. I've also had the opportunity to shadow physicians during psychiatric competency evaluations, which furthered my interest in clinical decision making in legal systems.

This experience was funded by Ki Ki Gore Endowed Internship Fund & The Endowed Internship Fund for Public Service

Poster #232

Title: *The Relationship Between Injury-Related Fear and Brain Activity in Individuals with Anterior Cruciate Ligament Reconstruction*

Presenter(s): Jonathan Vonderlage '26

Supervisors and Institutional Affiliations: Francesca Genoese (Professor of Kinesiology, University of Wyoming)

This summer, I worked as a research lab intern in Dr. Francesca Genoese's kinesiology lab at the University of Wyoming. My primary project examined the relationship between injury-related fear and brain activity in individuals who had undergone anterior cruciate ligament reconstruction. I reviewed literature, developed research questions, analyzed pre-collected fMRI brain scan data, and presented my findings in a research poster. I gained valuable skills in neuroimaging methods, statistical analysis, interdisciplinary research. I also deepened my understanding of how psychological and neurological concepts apply to physical rehabilitation.

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

Poster #234

Title: *Driftless Field School: An Immersive Field Study in Wisconsin, Examining the Lived Realities of Small-Scale Farmers in a Moral Market*

Presenter(s): Nina Wakabayashi '28

From July 7th to August 1st, 2025, I participated in the Driftless Field School, an immersive Environmental Humanities course hosted by Thoreau College in Viroqua, Wisconsin. This program, structured around a "microcollege" model, integrated academics, labor, community, nature, and art to provide a holistic, place-based education. I examined the lived realities of small-scale farmers within the context of the moral market and "ethical consumption". Through fieldwork, including interviews with conventional farmers, Amish farmers, and the founders of Organic Valley, I investigated the economic and regulatory challenges producers face. The project analyzed how producer-led solutions, such as the cooperative model, offer a practical response to these pressures, enabling farmers to regain bargaining power and address inequalities within the supply chain.

This experience was funded by David C. Donelson '77 Fellowship

Poster #233

Title: *The Carleton College Collection of Japanese Maps: Creating a Digital Index and a Foundation for Future Research*

Presenter(s): Nina Wakabayashi '28

Other Authors/Contributors: Asuka Sango (Director of Cross-Cultural Studies, Director of the Center for Global and Regional Studies, John W. Nason Professor of Asian Studies and Religion, Carleton College), Katie Lewis (Cataloging and Government Documents Librarian, Carleton College)

Supervisors and Institutional Affiliations: Asuka Sango (Director of Cross-Cultural Studies, Director of the Center for Global and Regional Studies, John W. Nason Professor of Asian Studies and Religion, Carleton College), Katie Lewis (Cataloging and Government Documents Librarian, Carleton College)

This project addresses the inaccessibility of Carleton College's extensive collection of World War II-era Japanese maps, which have been obscured by a language barrier. The primary goal was to create a comprehensive digital index to serve as a foundation for future research. Using Japanese language proficiency, maps were systematically cataloged into a searchable database. A comparative analysis with other digital archives, such as those at Stanford University and Tohoku University, revealed the collection's unique strength: a heavy concentration of maps focusing on Japan's northern strategic borderlands, including Manchuria (233 maps), the Soviet Union (211 maps), and Siberia (167 maps). This focus is a product of the U.S. Army Map Service's post-war priorities approaching the Cold War. In collaboration with librarians, this project improved the collection's digital accessibility by enhancing metadata structures, making these valuable historical documents available to a wider audience.

This experience was funded by Humanities Center SRP

Poster #235

Title: *Paleogeographic Constraints of the Mozambique Ocean through the Neoproterozoic from Paleomagnetism of the Central Egypt Desert*

Presenter(s): Jason Wan '27

Other Authors/Contributors: Nicholas Swanson-Hysell '05 (Associate Professor of Earth and Environmental Sciences, University of Minnesota), Yiming Zhang (Postdoctoral Fellow, University of Minnesota)

The Arabian–Nubian arc terranes represent the largest region of Neoproterozoic accretionary crustal growth, yet their paleogeographic positions within the Mozambique Ocean remain poorly constrained. We report new geochronologic and paleomagnetic results from the late Tonian (~726 Ma) Shaat dike swarm in southern Oman, integrated with geochronology from the early Cryogenian Wadi Ghadir ophiolite, late Cryogenian Kadabora pluton, and Ediacaran Kadabora dike swarm in Egypt's Central Eastern Desert. The Shaat dikes yield magnetization carried by magnetite that passes conglomerate,

reversal, and baked contact tests, placing Oman at $37.5 \pm 2.5^\circ$ paleolatitude and $\sim 80^\circ$ counterclockwise from its present orientation. These results support a reconstruction where Oman, India, and South China formed a contiguous plate on the northern Mozambique Ocean margin, implying an ocean width >5500 km before Gondwana assembly. Preliminary data from Egypt further constrain terrane accretion and deformation, refining paleogeographic models that link Mozambique Ocean closure to global events such as Snowball Earth.

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

Poster #236

Title: *Lay Firm Internship: Case Analysis and Contract Review*

Presenter(s): Harper Wang '28

During my summer internship at Beijing Haiqian Law Firm, I gained firsthand experience in case analysis, contract review, and legal practice. I assisted attorneys in examining corporate and intellectual property disputes, including a case involving the Palace Museum's cultural products and a contract dispute impacted by international delays. My responsibilities ranged from analyzing legal documents to revising lease and rental agreements, which strengthened my understanding of risk assessment in contracts. This internship not only enhanced my legal writing, research, and critical thinking skills but also gave me valuable insight into the importance of communication, patience, and practical judgment in legal work. Supported by the Trustee Endowed Internship Fund, this experience deepened my commitment to pursuing a career in law.

This experience was funded by Trustee Endowed Internship Fund

Poster #237

Title: *Alaska Beauty Peony Co-op Internship*

Presenter(s): Hadley Ward '27

The Alaska Beauty Peony Co-op is a collective of 12 farms working to grow over 40 varieties of peonies through sustainable farming practices. As a Co-op intern, I assisted in everything from harvesting the fields to packaging and shipping the wholesale orders to companies such as Urban Stems and Safeway. Through this experience, I learned the importance of adjusting your business to the needs of a changing market, filling a niche market through the use of micro-climates, and what sustainable boutique farming looks like for a profitable business.

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

Poster #238

Title: *Interning at the Exoneration Project*

Presenter(s): Sam Watson-Stevens '27

I interned at the Exoneration Project which provides pro bono legal representation for wrongfully incarcerated people. My work involved assessing applications from convicted people seeking our assistance. In addition, I helped develop a financial literacy program for clients who were recently exonerated, completed various projects for attorneys and attended evidentiary hearings. I am continuing reviewing applications remotely this academic year.

This experience was funded by Rob White '85 Endowed Internship Fund

Poster #239

Title: *Traversing the Digitization Pipeline: From Archived Specimens to AI Transcriptions and Databasing*

Presenter(s): Alex Wcislo '26

I spent the summer working on opening the bottle neck in the Field Museum's pipeline process for digitizing the archived specimens in the herbarium. The vast majority of my work was writing scripts for databasing, validation, and error checking. However, I also helped a fellow intern with his project focusing on training an AI model to recognize text. Handwriting (especially century old cursive) proved to be the most challenging aspect of this training.

This experience was funded by Elizabeth K. Ester '79 and Michael T. Brody Endowed Internship Fund

Poster #240

Title: *Brood Pollination of Oenocarpus Mapora*

Presenter(s): Lucas Wcislo '26

Brood pollination is a mutualism where insects pollinate flowers while using them as sites for larval development. The tropical palm *Oenocarpus mapora* depends on beetles, primarily *Anchylorhynchus* weevils, yet this relationship is hardly studied. This study used four pollination treatments, and tracked egg laying, larval development, and flower abortion rates across multiple trees and branch positions. The experiment allowed for in depth analysis to quantify the costs and benefits of pollination success and seed predation in this mutualistic relationship.

This experience was funded by Elizabeth K. Ester '79 and Michael T. Brody Endowed Internship Fund

Poster #241

Title: *Season and Age Influence Paced Mating Behavior, with Differences in Hit Rate, Mounts, and Proceptive Behaviors Between Fall and Spring*

Presenter(s): Jennifer Wen '27, Lilly Soillis '28

Other Authors/Contributors: Sarah Meerts (Program Director of Neuroscience, Professor of Psychology and Neuroscience, Carleton College), Tyler Beasley (Carleton College)

Supervisors and Institutional Affiliations: Sarah Meerts (Program Director of Neuroscience, Professor of Psychology and Neuroscience, Carleton College), Tyler Beasley (Carleton College)

Seasonal variations alter testosterone levels in male and fecundity in female laboratory rats, even when housed in light-, temperature-, and humidity-controlled conditions. Our lab is interested in paced mating behavior, where female rats control the rate of copulation. Specifically, we report how measures of paced mating change over multiple mating experiences. Thus, we considered whether paced mating behavior in our lab differs between fall and spring seasons. We reanalyzed existing paced mating behavior data from several fall and spring experiments. Relative to fall experiments, female rats exhibited more proceptive and rejection behaviors and received fewer intromissions per mount in the spring. Contact-return latency, did not differ between fall and spring. However, number of mounts and intervals to intromissions were significantly higher in the spring. We propose that the pattern of behavior observed during spring experiments is due to the male stimulus rats being older in the spring than the fall.

This experience was funded by Psychology Department at Carleton College

Poster #242

Title: *Summer Internship at HHZX Human Resources Consultancy*

Presenter(s): Liwei Weng '26

Summer Internship with Beijing Huaheng Zhixin Human Resources Consultancy, assisted with headhunting outreach and gained proficiency in SaaS platforms.

This experience was funded by Multicultural Alumni Network (MCAN) Fellows Program

Poster #243

Title: *Wrangell Mountain Center - 2025 Summer Internship*

Presenter(s): George Wening '27

Through my summer internship, I worked as a program assistant for the Field Studies program, run by the private nonprofit Wrangell Mountains Center. The organization is based in McCarthy, Alaska, in the heart of Wrangell-St. Elias National Park. I led lectures, set up talks, and facilitated discussions for the cohort of 9 undergraduate students. Throughout the seven weeks, they conducted original field research projects on alpine ecology, geology, and glaciology, for which I served as a near-peer mentor.

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

Poster #244

Title: *Optimization of CRISPR in RAW264.7 Macrophages*

Presenter(s): Nadia Whalen '27

Other Authors/Contributors: Angel Solis (Assistant Professor of Biology, Carleton College)

Supervisors and Institutional Affiliations: Angel Solis (Assistant Professor of Biology, Carleton College)

Macrophages are crucial cells in the innate immune response, functioning by engulfing and destroying foreign material, then transmitting signals to neighboring cells of the attack. Due to the nature of macrophages and their powerful capacity to fight off and defend against foreign DNA, modifications to the CRISPR-Cas9 protocol needed to be performed if we wanted to use this technology. This process involved the purification of the PX459 plasmid and subsequent ligation with two control oligos, Myd88 and CD3ε. These oligos were selected based on their relationship to macrophages. Myd88 functions as a positive control, as it plays a heavy role in immune signaling. CD3 serves as our negative control, as it resides only on T-cells. If the ligation is successful, this vector is transfected into our cell line, RAW264.7, using the lipofectamine 3000 reagent. This reagent was selected following the successful transfection of the PX459 plasmid into the RAW264.7 macrophages. This was confirmed by testing the puromycin resistance gene on the PX459 plasmid; macrophages transfected with lipofectamine 3000 showed significant survival in a lethal concentration of puromycin. We will be using this reagent to remove our control oligos from our cell line.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #245

Title: *Legislative Internship for the Massachusetts House of Representatives*

Presenter(s): Annie Wiener '26

This summer, I interned for my State Representative in the MA State House.

This experience was funded by Jean Phillips Memorial Internship Fund

Poster #246

Title: *Risk Prediction Models of Progression in Smoldering Multiple Myeloma Patients*

Presenter(s): Adriana Wiggins '26

Smoldering Multiple Myeloma (SMM) is an asymptomatic precursor of the blood cancer Multiple Myeloma (MM), where SMM patients are often monitored until progression to MM instead of immediate treatment. Upon diagnosis of SMM, three biomarkers are collected. The current risk stratification model categorizes patients for low, intermediate, or high risk of progression to MM based on the biomarkers. However, this risk stratification can be improved upon for identifying subpopulations among patients who do not progress to MM within a year of diagnosis. Specifically, we sought to find patients who could benefit from early treatment intervention before MM diagnosis.

This experience was funded by NIH Grant and Memorial Sloan Kettering Society

Poster #247

Title: *Development Intern at The Reporters Committee for the Freedom of the Press*

Presenter(s): Linnea Williams '26

Assisted in the advancement of fundraising and development initiatives by compiling detailed research reports on statewide foundations for potential endowment funding. Conducted in-depth research on high-profile individual donors to update and maintain accurate donor profiles. Contributed to donor engagement efforts by writing and editing monthly email campaigns promoting continued support for press freedom. Participated in daily team meetings to review grant statuses, plan upcoming events, and address technical issues. Utilized internal databases to organize and track donor and foundation information, including interaction histories with the Reporters Committee for Freedom of the Press (RCFP).

This experience was funded by Wiebolt Endowed Internship Fund

Poster #248

Title: *Interning with the American Bar Association Commission on Immigration*

Presenter(s): Lily Wong '26

This summer, I worked with the Commission on Immigration (COI) which is an entity of the ABA that spearheads national efforts to support justice in the immigration system. I worked with the COI on multiple projects: their detention hotlines, their immigration courtroom observation project, general asylum case research, and managing their physical and digital inboxes. The COI runs multiple hotlines to help those in immigration detention get legal information about their cases and connect them to other resources that could assist them further. I worked to organize materials for these calls, and interpreted Spanish for an English speaking volunteer attorney. This was a very rewarding experience, and very valuable to use my Spanish skills. I also was in charge of beginning the implementation of the courtroom observation work, and observed dozens of Master Calendar Hearings for people in immigration court in order to keep accountability in the immigration court system while it is being challenged right now. I also conducted research for an asylum case, and prepared materials for the client's asylum application. Lastly, I managed communication over email, and organized and processed physical mail to and from the COI.

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

Poster #249

Title: *Modeling Human Like Cognition with Neural Networks on Orientation Delay Estimation Task*

Presenter(s): Evelyn Xie '26

Supervisors and Institutional Affiliations: Sukbin Lim (Associate Professor of Neural Science, New York University Shanghai).

Prior work has shown that the pre-training approach of CNN+RNN models for color change detection and delay estimation yields learning performance similar to that of actual human data, while the end-to-end approach learns the tasks nearly optimally. Our work aims to generate a new pipeline using CNN+RNN models to investigate whether neural networks exhibit a cardinal repulsive bias similar to humans on the orientation delay estimation task.

This experience was funded by Trustee Endowed Internship Fund

Poster #250

Title: *Internship Experience in the Garment District: Insights into International Trade*

Presenter(s): Alex Xuan '26

During summer 2024, I interned for 10 weeks at IHL Group, a New York–based company specializing in importing women’s and children’s sleepwear from Chinese factories. Working in the Production team, I supported communication between overseas suppliers and local designers by processing product samples, drafting purchase orders and invoices, and tracking changes through each stage of production. When needed, I also contacted Chinese factories directly. Through this experience, I gained insight into the logistics of international trade, including how tariffs and shipping methods affect business decisions. Beyond technical skills, I learned the importance of adaptability, communication, and collaboration in a diverse workplace. This internship highlighted the contrast between classroom learning and real-world business practices, and it gave me valuable preparation for navigating professional environments in the future.

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

Poster #251

Title: *Health and Advocacy Across Borders: Internship at URACA*

Presenter(s): Ruishi Xue '27

This internship with URACA, a Paris-based organization supporting African immigrant communities, allowed me to work at the intersection of health, culture, and social advocacy. Over two months, I contributed to public health initiatives, including recruiting blood donors to combat sickle cell disease and conducting HIV, hepatitis B, and hepatitis C screenings in underserved neighborhoods. In the office, I carried out client pre-screenings and assisted with translation, making services more accessible for those not fluent in French. These experiences improved my French proficiency, strengthened my cross-cultural communication skills, and gave me insight into the systemic barriers immigrants face. More importantly, the internship helped me recognize the value of advocacy and the kind of professional I hope to become. Although I am still exploring which area of law I want to pursue, this experience will serve as a guide as I navigate my path forward in college and beyond.

This experience was funded by Rob White '85 Endowed Internship Fund

Poster #252

Title: *Approaches to Welcoming Newcomers in Semi-Public Online Communities*

Presenter(s): Zijian Xun '27

Other Authors/Contributors: Owen Xu '27, Sneha Narayan (Assistant Professor of Computer Science, Carleton College)

Supervisors and Institutional Affiliations: Sneha Narayan (Assistant Professor of Computer Science, Carleton College)

Joining a new online community can be an overwhelming experience for a user seeking to understand the norms of interaction in an unfamiliar space. Moderators of communities hosted on platforms like Discord and Slack make a number of different technological and organizational choices to help new users make sense of the community they've joined. We interviewed moderators from 9 semi-public Discord servers and Slack workspaces to understand how they use technology (such as roles, permissions, and bots) in combination with social and organizational processes to welcome and orient new members to their communities.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #253

Title: *Creating Training Material for Computational Analysis of French Literature*

Presenter(s): Janet Yan '27

Assisting at LaTTiCE (Linguistics and NLP focused research lab) in Paris, France, annotating a given text to create training material for a program that analyzes French literature

This experience was funded by Abeona Endowed Fund for International Internships

Poster #255

Title: *Alternating fire-induced mass flowering by the prairie forb *Eryngium yuccifolium* reduces pre-dispersal seed predation in Arb restored prairies*

Presenter(s): Ryan Yang '27, Lily Johnson '27

Other Authors/Contributors: Ava McQuain '27, and Mark McKone (Towsley Professor of Biology & Research Supervisor of Cowling Arboretum, Carleton College)

Supervisors and Institutional Affiliations: Mark McKone (Towsley Professor of Biology & Research Supervisor of Cowling Arboretum, Carleton College)

It has been proposed that some flowering plant species avoid seed predation by satiating seed predators during mass synchronous flowering (masting). We used the fire-induced masting of *Eryngium yuccifolium* to test this hypothesis. The highly specialized pre-dispersal seed predator *Coleotechnites eryngiella* leaves a visible sign of attack, allowing visual assays of predation rate. We measured seed predation on the largest inflorescence per plant in two adjacent areas of the Cowling Arboretum, Northfield MN, with different burn histories. One site was burned in 2023 but unburned in 2023; the other site was burned in 2023 but unburned in 2025. In each site, insect damage was significantly reduced by ~50% in the year the site was burned (and therefore mass flowered) compared to the same site when it was unburned. This demonstrates that variation in insect damage is explained by flower density and subsequent predator satiation rather than by year or location.

This experience was funded by William and Elizabeth Muir Endowed Fund

Poster #254

Title: *Evaluating a Stakeholder and Equity Data-Driven Implementation (SEDDI) of HPV Self-Sampling Initiatives Across Primary Care Clinics*

Presenter(s): Andy Yang '28

Human Papillomavirus (HPV) self-sampling can increase cervical cancer screening rates by addressing barriers (e.g., mobility issues) that prevent equitable screening among women. Stakeholder and Equity Data-Driven Implementation (SEDDI) is a promising approach to adapting HPV self-sampling in clinics that serve populations experiencing disparities in cervical cancer screening. This study assesses the feasibility of implementing the SEDDI approach in HPV self-sampling initiatives in collaboration with four Minneapolis–St. Paul clinics. Focus groups were held with implementation teams from two clinics. Transcripts were cleaned, deidentified, and analyzed using rapid qualitative analysis. The SEDDI process helped implementation teams identify gaps in cervical cancer screening. Both clinics introduced HPV self-sampling for all patient populations. Teams found the implementation guide and the research team's technical support to be crucial to a successful rollout. Healthcare professionals responded positively to the SEDDI approach, viewing it as an effective strategy for implementing new evidence-based interventions.

Poster #257

Title: *Traditional Chinese Medicine: A Philosophy of Healing, Survival, and Health*

Presenter(s): Nicole Yao '28

This poster explores the philosophies and practices of Traditional Chinese Medicine (TCM), comparing them to Western medicine and considering how the two systems can be integrated for improved patient outcomes. TCM, an ancient healing system, focuses on balancing the body's vital energy, qi, through practices like acupuncture, herbal medicine, and tai chi. While Western medicine emphasizes standardized diagnoses and pharmacological interventions, TCM takes a holistic approach, addressing individual disharmonies. The research, based on observations at Beijing Hospital, suggests that TCM and Western medicine are not opposing forces but different perspectives on health. By integrating these approaches, a more comprehensive and holistic system of patient care can be achieved, focusing on both the prevention and treatment of illness.

This experience was funded by Chang-Lan Endowed Fund

Poster #258

Title: *Atmospheric CO₂ Capture Using LDOs (Layered Double Oxides)*

Presenter(s): James Yi '28

Rising CO₂ levels are driving research into carbon capture and storage (CCS), one of which is the use of layered double oxides (LDO) to adsorb CO₂ molecules. This project compared the CO₂ adsorbing efficiencies of LDOs formed from different divalent/trivalent metal combinations. Glove box experiments showed that Mg/Al LDOs were the most effective material tested. This work contributes to the current literature on LDO CO₂ adsorption and invites subsequent studies on variables like CO₂ concentration and LDO mass to optimize efficiency.

This experience was funded by Class of 1970 Endowed Internship Fund

Poster #259

Title: *From Divine to Human: How Ptolemaic Coinage Innovated Within Alexander's Standard*

Presenter(s): Sophia Ying '26

Other Authors/Contributors: Jake Morton (Associate Professor of Classics, Carleton College), Cherlon Ussery (Professor of Linguistics, Carleton College)

In order to have a monetary value, coins must be trusted by those who use them. Thus, the iconography on coins must convey legitimacy. Alexander the Great flooded the Mediterranean and Near Eastern

markets with his own coinage, establishing a standard for the design of legitimate coins. After Alexander's death, his generals, each fighting to seize his empire, minted new coins of their own. It is widely accepted that rulers continued to mint Alexander's style of coinage for centuries after his death. I analyze the coins displayed at the Vergina Tombs Museums in Aigai, Greece, focusing on the evolution of the coinage of the kingdoms that formed out of Alexander's empire. I argue that although all coins in this collection are undeniably emulating Alexander's style of coinage, one of Alexander's generals—Ptolemy I—pushed the boundaries of Alexandrian coinage in order to forge a new, dynastic identity.

This experience was funded by Mellon Mays Undergraduate Fellowship

Poster #260

Title: *The Ruins of the Old Palace: Historical Memory and Revisionism Through the Tours of the Chosŏn Kings*

Presenter(s): Hope Yu '26

Other Authors/Contributors: Victoria Morse (Chair of History, Program Director of Medieval and Renaissance Studies, Professor of History, Carleton College), Cherlon Ussery (Professor of Linguistics, Carleton College), Seungjoo Yoon (Associate Professor of History, Carleton College).

The palace of the Koryŏ Dynasty (918-1392) burned to the ground in 1362. During the later Chosŏn Dynasty (1392-1897), the palace ruins became one stop on the kings' tours around Kaegyŏng, the old capital. These Chosŏn kings would host the civil service examinations upon the ruins themselves. Kim Jiyoung argues that Kaegyŏng served as the prime locale for the Chosŏn regime to disseminate their Neo-Confucian ideology. I argue that the examinations were enacted upon the Koryŏ palace ruins to place Neo-Confucian values onto the memory of the pluralist Koryŏ dynasty. The act of hosting Confucian literati upon the ancient palace, known for its kings' Buddhist, Daoist, and shamanistic beliefs, demonstrates the physical significance of the old palace's space for the Chosŏn people. The Koryŏ palace ruins were thus the prime location to impart a new Neo-Confucian politics such that the fields of the old palace ruins would later come to be understood as playing a central role in the creation of Confucian scholars.

This experience was funded by Mellon Mays Undergraduate Fellowship

Poster #261

Title: *Proliferation Inhibition Effect of Afatinib on Colon Cancer Cells*

Presenter(s): Esther Yun '27

Colon cancer is one of the most prevalent cancers in the world, and in many instances, dysregulation of EGFR signaling is a major cause of uncontrolled growth. The effects of the irreversible EGFR inhibitor afatinib on colon cancer cells are less well established, but it has been approved for non-small cell lung cancer. In this project, we used cell viability assays to assess the cytotoxic and cytostatic effects of Afatinib on three human colon cancer cell lines (LoVo, Colo205, and SNU-C2A). Cells were treated with a range of Afatinib concentrations (0–50 μM), and IC_{50} values were calculated from viability measurements. Our results show that Afatinib reduced cell viability across all three lines, with LoVo cells showing the highest sensitivity ($\text{IC}_{50} = 0.687 \mu\text{M}$) compared to Colo205 (2.329 μM) and SNU-C2A (2.499 μM).

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

Poster #262

Title: *Working as a Lake Programs Field Intern with the Lake Stewards of Maine*

Presenter(s): Naomi Zeidenberg '26

This summer I worked for the Lake Stewards of Maine, a nonprofit organization which promotes lake stewardship through citizen participation in the gathering and dissemination of credible scientific information pertaining to lake health. More specifically, I worked with the Aquatic Invasive Species team, which trains thousands of volunteers across the state to monitor their lakes for aquatic invasive species and to assist in rapid response removal programs should an invasive species be found. My tasks included preparing for plant identification workshops (designing and printing handouts, prepping plant samples), assisting with set up for and instruction at workshops (teaching participants how to ID plants), volunteer outreach (emails, newsletters, phone calls), preparing and processing volunteer documentation, reviewing and entering lake monitoring data from volunteers and professionals, inspecting and repairing equipment (kayaks, boats, kayak scopes, field guides, identification tools), photo-documenting volunteer trainings for newsletters and social media, and day-to-day office tasks.

This experience was funded by Littell Endowed Internship Fund and Class of 1970 Endowed Internship Fund

Poster #265

Title: *Geothermal Heating Costs Under Policy Uncertainty: Estimating the Impact of Inflation Reduction Act Funding*

Presenter(s): James Zhang '26

Supervisors and Institutional Affiliations: Devavani Chatterjea (Program Director and Professor of Environmental Studies, Carleton College)

This study estimates the projected cost of implementing a geothermal heating system at the Northfield Community Resource Center by benchmarking Carleton College's geothermal project, which cost \$42 million. Using ArcGIS spatial analysis to determine the facility's floor area, the Northfield system is estimated at approximately \$865,000, or \$36.94 per square foot. Federal incentives under the Inflation Reduction Act (IRA) could offset 30–50% of this cost, significantly improving economic feasibility. However, recent policy actions—namely Executive Order 14154 and Public Law No. 119-21—have introduced legal and administrative uncertainty surrounding IRA funding. Although tax credits remain in statute, litigation and political signals have destabilized investor expectations and delayed municipal planning. This policy risk is particularly consequential for capital-intensive systems like geothermal heating, which require high upfront investment but offer long-term efficiency and low emissions. The findings underscore the critical role of policy stability in facilitating climate infrastructure investment and achieving federal decarbonization goals.

This experience was funded by Environmental Studies Program at Carleton College

Poster #263

Title: *Investigating the Role of NME2 in the Innate Immune Response of Macrophages*

Presenter(s): Emily (Xiaohan) Zhang '27

Other Authors/Contributors: Angel Solis (Assistant Professor of Biology, Carleton College), Rachel Punter '28, Nadia Whalen '27, Christina Song '28

Supervisors and Institutional Affiliations: Angel Solis (Assistant Professor of Biology, Carleton College)

Our research aims to investigate NME2's role in innate immune response, i.e. cytokine production as well as the potential role of NME2 as a transcription factor for inflammatory proteins in macrophages. Our results show that stauprimide (Spd), a NME2-specific inhibitor, does not affect macrophage viability. It is also shown that Spd decreases the production of proinflammatory cytokines including IL-6, IL-1 β , and TNF both in macrophages stimulated with Pathogen-Associated Molecular Patterns (PAMPs) and in macrophages stimulated with live bacteria *Pseudomonas aeruginosa*. Moreover, through qPCR analysis, it is shown that Spd decreases the relative gene expression of IL-6 in macrophages following lipopolysaccharide (LPS) stimulation. Spd also decreases the expression of other inflammation-related genes including Ccl9, Cxcl2, and Nos 2. However, Spd has no effect on NME2 gene expression, which is in line with our previous knowledge that Spd inhibits NME2 through inhibiting its nuclear localization.

This experience was funded by Harry A. and Margaret D. Towsley Foundation Fellowships in the Sciences

Poster #266

Title: *Coherent Umbrella-like Vibration of Methyl Radical Studied with Core-level Transient Absorption Spectroscopy*

Presenter(s): Owen Zhang '26

Supervisors and Institutional Affiliations: Stephen R. Leone (Professor of Chemistry, UC Berkeley), Daniel M. Neumark (Professor of Chemistry, UC Berkeley)

Photochemical dissociation can induce relatively large structural changes in molecules, launching vibrational motion in the resulting photofragments. If the induced vibrations are coherent, information about the dissociation is encoded onto the vibrational dynamics. We used femtosecond X-ray transient absorption spectroscopy to resolve the time domain vibrational motions of alkyl and ally iodides following C-I bond breaking induced by ultraviolet excitation. The C-I bond is broken following ultrafast excited-state curve crossing, providing a model platform to investigate connections between nonadiabatic dynamics and coherently activated molecular vibrations.

This experience was funded by Robert J. Kolenkow and Robert A. Reitz Endowed Fund for Student Scientific Research

Poster #264

Title: *IT Intern: Empowering Global Supply Chain Workflows*

Presenter(s): Emma Zhang '27

During Summer 2025, I interned as an IT intern at St. Edenweiss, a Chinese cashmere trading company traditionally focused on Business-to-Business operations. The company recently began expanding into Business-to-Consumer sales, aiming to reach international customers directly. My main responsibility was supporting the development of a stand-alone e-commerce site. I researched user needs by consulting different departments and competitors, designed the website framework in Figma, and filtered backend data using SQL. I also developed the product display page using React to improve user experience. Additionally, I introduced an AI-powered tool to generate digital previews of product patterns, streamlining client communication and approval processes. Through this internship, I gained skills in bridging business needs and technical solutions, deepened my understanding of cross-department collaboration, and discovered my passion for using technology to empower businesses.

This experience was funded by Trustee Endowment Internship Fund

Poster #267

Title: *Rps19bp1 Loss Triggers Ribosomal Stress and p53-Mediated Heart Defects*

Presenter(s): Aaron Zhao '28

Supervisors and Institutional Affiliations: Zengming Zhang (Assistant Project Scientist, Medicine, UCSD)

During my summer internship in the Ju Chen Lab at the University of California, San Diego, I investigated the role of Rps19bp1, a ribosome-associated protein, in cardiac development. Using mouse genetics, PCR genotyping, Western blotting, and histological analyses, I investigated how Rps19bp1 regulates p53 stability in the developing heart. My findings showed that global knockout of Rps19bp1 resulted in embryonic lethality, while heart-specific knockout caused abnormal cardiac morphology, impaired proliferation, and postnatal death. Western blot analysis revealed elevated p53 levels in knockout hearts, suggesting that ribosomal stress stabilizes p53 independently of SIRT1. Together, these results indicate that Rps19bp1 is essential for normal heart development in mice. Loss of Rps19bp1 in cardiomyocytes activates p53, which impairs cardiomyocyte proliferation and leads to prenatal lethality. This work contributes to understanding how ribosomal stress pathways shape cardiomyocyte survival and may inform future studies on mechanisms underlying heart failure.

This experience was funded by Class of 1970 Endowed Internship Fund

Poster #269

Title: *Phecode Analysis of Stuttering in Patients with Down Syndrome within Vanderbilt University Medical Center Electronic Health Records*

Presenter(s): Jincheng Zhao '28

Other Authors/Contributors: Dillon Pruett (Assistant Professor, Florida State University), Alyssa Scartozzi (Ph.D Student, Vanderbilt University), Robin Jones (Assistant Professor of Hearing & Speech Sciences, Vanderbilt Kennedy Center), Stephen Camarata (Professor of Hearing & Spee

Supervisors and Institutional Affiliations: Dillon Pruett (Assistant Professor, Florida State University), Alyssa Scartozzi (Ph.D Student, Vanderbilt University)

This study aims to 1) characterize how stuttered speech is noted by medical professionals in DS patients within the EHR and 2) explore shared comorbidities between DS patients who stutter and non-DS patients with developmental stuttering. Using the Synthetic Derivative of the VUMC EHR, a keyword search identified DS records with indicators of stuttering, which were manually reviewed to confirm cases and document descriptions of stuttering in DS patients. A phecode enrichment analysis was performed to calculate the frequency of phecodes (ICD 9 and 10-based diagnostic groupings) in DS patients who stutter and DS patients who do not stutter. Of the 8,105 DS patients in the EHR, 96 had confirmed stuttering (43 female). Comorbidities with developmental stuttering included sleep disorders.

Future studies may leverage BioVU resources to characterize genetic similarities between developmental stuttering and stuttering in DS using polygenic risk scores.

This experience was funded by Multicultural Alumni Network (MCAN) Fellows Program

Poster #268

Title: *Legal Internship With the Immigrant Law Center of Minnesota*

Presenter(s): Cindy Zhao '27

This internship with the Immigrant Law Center of Minnesota provided legal support to low-income immigrants and refugees. Responsibilities included conducting DACA renewal screenings, managing client intake interviews, and applying eligibility requirements to naturalization applications. I maintained ILCM's legal referral network and expanded attorney relationships for effective client services. The experience developed practical skills in case management, legal documentation, and client screening while building knowledge of U.S. immigration law, including naturalization, DACA renewals, and victim relief options. The position demonstrated how nonprofit organizations balance high service demand with limited resources through community outreach and partnerships amid evolving immigration policies.

This experience was funded by Trustee Endowed Internship Fund

Poster #270

Title: *Computational Investigation into the Role of B-Cells During In Situ to Invasive Breast Cancer Transition in Spatial Transcriptomics Data*

Presenter(s): Eric Zhou '26

Supervisors and Institutional Affiliations: Rasha Aljelaify (Karolinska Institute), Carsten Daub PhD (Karolinska Institutet)

Ductal/lobular carcinoma in situ (DCIS/LCIS) is a non life-threatening subtype of breast cancer characterized by abnormal growth of epithelial cells in the ductal-lobular system of breasts. In 10%-25% of DCIS/LCIS cases, the cancerous tissue escapes the ductal-lobular system and invades the surrounding tissue, becoming invasive ductal/lobular carcinoma (IDC/ILC). The transition from DCIS/LCIS to IDC/ILC is not well understood, but genomic studies indicate the tumor microenvironment (TME) is responsible for this transition rather than the cancerous tissue itself. T-cells within the TME have been given lots of attention in this context, but studies report conflicting results regarding the prognostic value of T-cells. However, B-cells have been largely neglected. Given their integral role in the immune system, a thorough investigation into their role in breast cancer progression is warranted. In this study, we use

spatial transcriptomics breast cancer data to investigate the role of B-cells in the DCIS/LCIS to IDC/ILC transition.

Poster #271

Title: *NCAM-Mimetic PA Nanoscaffolds as a Platform to Study Axonal Projection in Parkinson's Disease*

Presenter(s): Austin Zhu '26

Dopaminergic neurons in the substantia nigra (SN) project to the dorsal striatum and cortex to coordinate voluntary movement. Their progressive degeneration is the hallmark of Parkinson's disease (PD), the world's second most prevalent neurodegenerative disorder. Current therapies provide only symptomatic relief and do not prevent neuronal loss. Animal models have an advanced understanding of PD but are limited by species-specific differences, restricting translational relevance. Human brain organoids overcome this limitation by recapitulating human brain architecture and function. Peptide-amphiphile (PA) nanofibers further support neurite outgrowth in neurons and organoids. These self-assembling molecules contain a bioactive peptide terminal domain and internal domains that promote high-aspect ratio, water-soluble nanofibers. Their structure includes β -sheet-forming sequences, charged amino acids for solubility, and covalently bound aliphatic tails that induce hydrophobic collapse in aqueous media. The resulting cylindrical or ribbon-shaped nanostructures mimic fibrils of the natural extracellular matrix (ECM). The neural cell adhesion molecule (NCAM), a membrane glycoprotein essential for axonal extension, plays a critical role in the development of the nigrostriatal pathway that is severely disrupted in PD. Thus, we propose a PA nanoscaffold functionalized with an NCAM-mimetic peptide. This engineered substrate promotes axonal projection, providing a physiologically relevant platform to study PD mechanisms and evaluate therapeutic strategies.

Poster #272

Title: *Summer Internship with Northfield Union of Youth*

Presenter(s): Thea Zimmerman Comas '26

Over the summer, I interned with the Northfield Union of Youth, a local non-profit that strives to give power and voice to local youth and to create a caring and enriching community. I contributed to their mission by staffing the Key Youth Center. I strove to be a supportive adult presence by offering social and emotional assistance to at-risk youth, establishing and nurturing developmental relationships, and fostering youth leadership. I am walking away from this summer experience knowing that I have built lasting relationships and there was mutual influence, between myself and the youth, that will outlast the internship.

This experience was funded by Project '60 Endowed Internship Fund