Conference Program

CARLETON UNDERGRADUATE
Journal of Science

I-CUREUS & SaPP Showcase

Carleton University

April 9, 2025
11:00 am – 2:00 pm

PROGRAM SCHEDULE

11:00 am	**Opening Remarks**
11:00 am – 2:00 pm	**Poster Session**

For any questions, please email:
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TABLE OF CONTENTS

LETTER FROM THE CARLETON UNDERGRADUATE JOURNAL

This showcase program showcases the diversity of research conducted in the Carleton community by students completing projects through the Internship – Carleton University Research Experience for Undergraduate Students (I-CUREUS) and the Students as Partners Program (SaPP). All of the projects presented today serve to have substantial and tangible impacts on our society, such as by improving the understanding of disease pathology and treatment efficacy for chronic health conditions and facilitating applications of experiential teaching and learning in social justice-oriented education. This showcase program celebrates these incredible projects and the students' hard work over the past year.

I-CUREUS and SaPP provide students with a unique opportunity to gain applied experience in research and course development, an opportunity that many students may not have been otherwise able to access. Having completed a term in the SaPP in 2020, I can speak firsthand to the valuable working relationships, strong critical thinking and communication skills, and deep understanding of pedagogy that I developed in the program. These skills have been indispensable to my academic journey and I am incredibly grateful for the mentorship I received from my staff partners in completing my term. These programs are strong pillars of Carleton's community and I look forward to seeing the program continue to grow in the coming years.

The Carleton Undergraduate Journal of Science was created to showcase the exceptional work of Carleton's undergraduate community and the students participating in today's conference and showcase exemplify this mission. It has been a privilege to collaborate with Aleksandra Minic, the Future Learning Lab Program Coordinator, on this issue.

For attendees, we hope that these projects leave you reinvigorated with academic curiosity, a drive for exploration, and a deeper understanding of the research of your peers. This showcase program is an invaluable opportunity to engage with research that is actively occurring in the Carleton community and to learn from other passionate researchers in your community!

Warmly,

Ellen Coady

Co-Editor-in-Chief
Carleton Undergraduate Journal of Science

Students as Partners Program

CREATING AN UNDERGRADUATE STUDENT HANDBOOK FOR SCIENTIFIC JOURNAL PUBLICATION

Claire Carver, *Honours Bachelor of Science in Neuroscience & Biology*

Staff Partner: Dr. Katie Lucas

The Undergraduate Student Handbook for Scientific Journal Publication was developed to support first-year students in understanding and navigating the academic publishing process. Designed for NSCI 1000, an interdisciplinary seminar focused on scientific literacy and communication, the handbook builds on a course assignment where students create infographics about Citizen Science projects. It provides clear, step-by-step guidance on the publication process, from peer review to editing, enabling students to create a special edition of the Carleton Undergraduate Journal of Science (CUJS) containing their infographics. The final product for this project is a comprehensive 38-page handbook outlining the eight key steps in the CUJS publication process. It includes specific sections for authors, peer reviewers, editors, and copy editors. Each section contains detailed checklists and resources so everyone involved in the publication process can easily complete their designated steps. Additionally, it provides supplemental resources to support students in research, writing, and infographics and poster creation.

VISUALIZING MOLECULAR NEUROSCIENCE: OPTIMIZING KNOWLEDGE RETENTION USING MULTIMODAL LEARNING

Kiara Doobay, *Honours Bachelor of Cognitive Science*

Staff Partner: Dr. Matthew Holahan

Understanding neuroscience can be challenging due to the integration of simultaneous processes within any given system. While existing resources like textbooks and videos offer foundational knowledge, they often lack alignment with specific course objectives, potentially overwhelming students with irrelevant details or missing critical information. This project focused on creating tailored learning materials designed to support students in *NEUR 2202*: Cellular and Molecular Neuroscience. Using evidence-based cognitive strategies, including chunking, tiered vocabulary, scaffolding, and comprehensive scientific illustrations, the project aimed to break down complex topics into manageable, structured units that enhance comprehension and long-term retention. By making the content more organized, visually accessible, and progressively challenging, these resources not only help students master difficult concepts but also foster greater confidence and enjoyment in the subject.

EXPLORING AND ENHANCING EXPERIENTIAL TEACHING AND LEARNING IN SOCIAL JUSTICE-ORIENTED EDUCATION

Mya Duffy, *Honours Bachelor of Science in Neuroscience and Mental Health*

Staff Partner: Dr. Azar Masoumi

Experiential education is a unique approach to teaching, which can enhance student learning, engagement with material, and understanding of real-world situations. It particularly has potential to strengthen education in the social sciences, such as courses focused on topics related to social justice. This SaPP project aimed to explore experiential education in more detail in the literature and to map existing models of experiential education in disciplines related to social justice to identify ways to integrate experiential education more into *SOCI 2170*: Foundations in Social Justice, an undergraduate sociology course at Carleton University. The literature review conducted revealed service learning, problem based learning, land-based learning, and place-based education as four key types of experiential education. The review of public course syllabi uncovered many samples of experiential education used in similar courses at other institutions. These literature findings and applicable real-world examples provide a strong foundation to improve experiential learning in *SOCI 2170* for future years.

REIMAGINING STUDENT SUCCESS: USING SELF-ASSESSMENT AND REFLECTION TO ENCOURAGE STUDENT METACOGNITION

Braedon Frank, *Honours Bachelor of Arts in Psychology*

Staff Partner: Dr. Lindsay Richardson

The aim of this project is to redesign an assignment used in introductory psychology courses. This assignment is the student success portfolio, a cumulative assignment due at the end of term where students slowly build a portfolio using cuPortfolio to reflect on their learning and coursework. This project simplifies the assignment and uses a multimedia approach to improve accessibility and ease of access. The project also introduces new components such as a "connect and expand" section, where students connect external media such as music or video to their course learning to allow students to discuss their passions and interests. Ultimately, cuPortfolio is used to present the assignment instructions in one place.

THE PLACE OF SOUND - INSTRUCTOR HANDBOOK: TURNING ACADEMIC PROJECTS INTO PUBLICLY CIRCULATED MEDIA

Natalie Hall, *Bachelor of Journalism*

Staff Partner: Dr. Vincent Andrisani

The Place of Sound is a student-run radio show/podcast produced in Carleton University's Communication and Media Studies program. It has been a platform for student storytelling, professionalization, and public engagement for Communications students. The project is working to expand not only the scope of The Place of Sound to include students from across the University but also to create a resource for instructors to incorporate audio media into their teaching practice. The Instructor Handbook has been designed to integrate a public-facing element into coursework without requiring additional production work through affiliation with the show. This affiliation supports experiential learning by allowing students to engage with real-world audiences, develop media production skills, and gain recognition for their work. The document provides a complete overview on how to take coursework beyond the classroom, turning academic projects into publicly circulated media.

APPLYING THE NOVEL TECHNOLOGY OF PODCASTING TO LEARNING

Addison Jalbert

Staff Partner: Dr. Brian Strong

This project aimed to apply podcasting technology to *ALDS 4305A*: Teaching English Language: Methodology I. This required the creation of assignments for, and rearrangement of, the course. This innovation may enhance student engagement in the course.

CURRICULUM MAPPING & ENROLMENT TRENDS IN BIOLOGY COURSES

Isabella Mayol Giannotti, *Bachelor of Science*

Staff Partner: Dr. Martha Mullally

The goal of this project is to develop a curriculum map for the biology program at Carleton. Program learning objectives and student enrolment are keys to building curriculum maps. In this project, we examined historical student enrolment and processed this data as a heat map. We also surveyed students about their experiences in biology courses. Specifically, we examined the extent to which students are aware of program learning objectives, and if they recognize the alignment of learning experiences in biology courses with the program learning objectives.

RETHINKING RESILIENCE: EVALUATING AN INTEGRATED ACADEMIC RESILIENCE CURRICULUM IN UNDERGRADUATE STEM COURSES

Matteo Montgomery, *Honours Bachelor of Science in Neuroscience and Mental Health*

Staff Partner: Dr. Ashley Thompson

The Rethinking Resilience project includes an interactive Brightspace module designed to teach undergraduate students about stress, coping, and academic resilience. The goal of this module is to empower undergraduate students to identify their own stress responses, understand the effects of stress on the body and brain, and explore evidence-based strategies for enhancing their resilience in the face of moderate, everyday stressors such as those posed by an undergraduate degree. Given the known mental health challenges faced by undergraduate students in STEM (Pester, Noh, & Fu, 2023), it is hoped that this module may provide needed support to students and promote well-being, motivation, and healthy approaches to learning. In this way, it is hoped the module will augment existing STEM curricula and empower students to manage their academic workloads more effectively. We recently launched a pilot of the project with eleven participating classes, collecting pre- and post-module data regarding student stress and mental health, as well as feedback about the module. Continuing our meaningful collaboration, we intend to use this pilot data as a guide to evaluate the module as part of the curriculum in these courses and develop new ideas to further enhance its use, integrate it more intentionally into courses, and clarify expectations and usability for learners.

ENHANCING A FIRST-YEAR SEMINAR FOR OPTIMIZED LEARNING

Ruth Nobossi, *Honours Bachelor of Cognitive Science*

Staff Partner: Dr. Brendan Conway-Smith

In this project, we added to and improved the course content for the Thinking and Knowing (*FYSM 1607C*) Cognitive Science course, a two-term course that started in the fall. We used available information on the students' current performance and reception to the course to strategically re-design assessments for the course's 2nd term. Our three main goals with this project were to: 1) increase student engagement in the course, 2) facilitate connections between course topics, and 3) incorporate more supplementary materials and external resources. We accomplished this by creating an innovative group assignment to serve as the course's final and by adding additional course-related material and general first-year resources to the course Brightspace page. As a bonus, we expanded on the Metacognition unit in the course and mobilized Brendan Conway-Smith's extensive background on the topic to create a framework for the development of a new course on metacognition.

DEVELOPING A TUTORIAL TEMPLATE FOR *PHIL 2001*

Jack Ragan, *Honours Bachelor of Arts in Philosophy*

Staff Partner: Dr. Elisabeta Sarca

PHIL 2001 (Introduction to Logic) is a second year philosophy course that is open to first year students. Interest in this course has grown in the past few semesters, with enrollment of approximately 350 students per semester. In this course, skill practice is essential for student success and this practice is in large part achieved through tutorials which are run by teaching assistants. However, the efficacy and interest in the tutorials throughout past semesters have been mixed, lacking in consistent results and delivery. As such, the project aimed to create a database of examples and template materials that the TAs can draw from, ensuring consistency across the sections.

Drawing from my experience as a long-term TA for the course, I provided insight into the needs of students, as well as the challenges faced by the TAs in tutorials. Through a highly collaborative process, a variety of resources were developed to be shared and used in future semesters, including: a weekly curriculum for tutorials, an overview of key concepts to be covered in tutorials, a problem bank featuring examples drawn from pop-culture, news, and philosophical texts, and a TA 'best practices' guide. These resources are highly transferable to future semesters and will improve both the quality and consistency of tutorials. Additionally, this model could be adapted for other courses with tutorial sections.

INCORPORATING NEURODIVERSE PERSPECTIVES AND LIVED IMPLICATIONS INTO TEACHING ABOUT DYSLEXIA

Holly Zayachkowski, *Bachelor of Arts in Linguistics*
Staff Partner: Dr. Tamara Sorenson Duncan

My project involved incorporating the lived experience of dyslexic individuals into course material through enhanced lecture material, an updated assigned readings list, an end of unit assignment, and comparative class discussion questions. I deeply analyzed existing frameworks of dyslexia, largely based in a medical model of disability, to redefine our understanding of dyslexia through a social model of disability and neurodiversity paradigm.

Internship – Carleton University Research Experience for Undergraduate Students

APPLICATION OF APTAMERS FOR NEURODEGENERATIVE DISEASES

Asfiya Aziz, *Honours Bachelor of Science in Neuroscience and Mental Health*

Supervisor: Dr. Maria DeRosa

Aptamers are single-stranded oligonucleotides that can be used as therapeutics for disease. My project focused on neurodegenerative disease following aptamers for A-syn aggregation and aptamers for traumatic brain injuries. I worked with several lab instruments to develop a chimera for the A-syn inhibition, and learned about the research process, methodology, literature searches and wet laboratory skills involved in science research.

TESTING THE BENEFITS OF RAT TICKLING AND ENRICHMENT ON A RODENT MODEL OF PERSISTENT INFLAMMATORY PAIN

Emma Bondar, *Honours Bachelor of Science in Neuroscience and Mental Health*

Supervisor: Dr. Michael Hildebrand

Chronic pain is a debilitating health problem that affects millions of people worldwide, with a need for new, safe, and effective treatments. Current approaches to addressing this issue include nocifensive (pain-related) behaviour testing in animals and targeting specific molecular determinants to observe how they influence pain behaviours in rodent models. Pain is a biopsychosocial phenomenon, even in rodents, and stress states and basal experiences can modulate pain outputs, which can be a major confound in nocifensive behaviour testing. This confound is often overlooked, as research animals are often treated as testing tools instead of as living organisms. We are applying novel approaches to reduce baseline stress and to create a bond between animal and researcher in animals undergoing evoked somatosensory testing (von Frey filament testing, VFF). The goal of this project will be to test the effects of rat tickling and playtime on the lab's well established persistent inflammatory pain model. We will be undertaking 5 enrichment aims (cage enrichment, food enrichment, post-procedure toy enrichment, tickling, and playtime) as well as implementing an extended acclimatization period. These techniques have been shown to reduce baseline levels of stress in rodents. We will be applying these techniques to our current protocol, where male and female rodents will undergo 5 days of VFF testing chamber acclimatization, then 3 days of baseline VFF testing, followed by a 5-day rest period. The rodents will then undergo one more day of baseline VFF testing followed by a left hind paw footpad injection of the pro-inflammatory substance Complete Freund's Adjuvant (CFA) followed by VFF testing 24-, 48-, and 72-hours post-injection to verify that pain hypersensitivity is induced.

Tickling increases the strength of the bond between the animal and researcher, and preliminary bouts of tickling positively transform rodent-researcher interactions. In the second aim of this project, we will compare two groups of rats, one with enrichment and gentle handling, and one with enrichment and tickling to compare the effects of these interventions on the results of the VFF testing, and how they change in a persistent inflammatory pain model. These approaches have not been implemented before as an intervention in a persistent inflammatory pain model. In doing so, we hope to create a bond between rodent and researcher, as well as reduce baseline levels of stress in the animals to increase efficacy and experimental outcomes.

HOW COMPANIES RESPOND TO ENVIRONMENTAL CHALLENGES

Oscar Chavez, *Honours Bachelor of Economics*

Supervisor: Dr. Jinsun Bae

Using twenty scholarly articles provided by Professor Jinsun Bae, information was extracted using a literature review from alongside Dr. Bae's larger project. Her project examines corporate responses to labor and environmental issues as reported in journal articles of the past twenty years across various social science disciplines. My literature reviews aim to answer how companies respond to environmental challenges in global supply chains. Overall, companies faced pressure from stakeholders, especially NGOs and consumers, which is one of the main reasons they adopted sustainable strategies.

BUILDING AND ACTIVATING SOCIAL NORMS THROUGH PERSONAL CLIMATE EMISSIONS FEEDBACK

Hoang-Nam Chu, *Honours Bachelor of Mathematics in Statistics & Economics*

Supervisor: Dr. Vivian Hoffmann

My project involved the design and implementation of a household carbon emissions calculator in a consumer survey. The idea behind the project is to observe and analyze the role that feedback has on consumers' decision making when it comes to making choices between carbon intensive and non-intensive activities. The main theory is that when you're presented with feedback and advice on your carbon emissions, you are more likely to choose 'greener' choices as opposed to those who are not presented with this feedback.

GEOLOGICAL HISTORY OF BELL REGIO, VENUS

Erin Duxbury, *Honours Bachelor of Science in Environmental Science*

Supervisor: Dr. Richard Ernst

Themis Regio, located at the SE corner of the Beta-Atla-Themis (BAT) region of Venus, is notable for its major mantle plumes with associated long connecting rift zones (up to 10,000 km in length). In this research we map the extensional lineaments (grabens-fissure-fractures) on the east side of Themis Regio (290-310°E, 30-50°S) in order to characterize the dyke swarm history of this region and the associated magmatic centers. This work complements other mapping studies by the International Venus Research Group , which have focused on the two other corners of BAT, Atla Regio and Beta Regio. The present study is an opportunity to develop an improved understanding of the Themis Regio corner of the BAT region, located at the end of the long Parga Chasmata (rift zone).

Study Area: The western portion of the study area was mapped as part of Quadrangle Map V-53. The eastern part of the area lies in Quadrangle V-54 for which initial mapping was begun, but not completed. Some preliminary detailed mapping of graben-fissure-fracture systems was also done in the eastern part of the study area. The focus of the current mapping is extensional lineaments (grabens, fissures and fractures). Radiating, circumferential and linear extensional lineament sets are widespread on Venus and early interpretations of the Magellan images offered tectonic and dyke-linked interpretations. More recently, studies have identified criteria, such as lava flows spilling out of grabens and an association with pit chains acting on an extended timeline. These criteria indicate that extensional lineaments are the surface expression of underlying mafic dyke swarms existing on an extended timeline. For this study, data from the 1989-1994 NASA Magellan mission was used: mainly the 75m per pixel resolution Synthetic Aperture Radar (SAR) data and also the 4.6 km per pixel altimetry data. Mapping is being done using ArcPro 3.2, and also JMARS was used for reconnaissance work and generating topographic profiles. The principles of relative dating, primarily the principle of cross-cutting relationships, was used to form Interpretations of timing for magmatic and volcanic events.

Research Objective: The goal is to produce 1:500,000 scale mapping of dyke swarms in the study area, grouping them into radiating, circumferential and linear, which can be linked to the known magmatic centres and also used to identifying previously unknown centres.

Results: The present mapping is focused on the area 295-310°E, 30-45°S; so far 19,114 extensional lineaments (interpreted as dykes) have been mapped. The identified swarms were summarized in a table. Mapped extensional lineaments (grabens-fissures and fractures) are provisionally grouped into radiating and circumferential swarms linked to magmatic centres. Additional regional linear sets are mapped and could belong to magmatic centres outside the study area. It has been previously shown that radiating swarms can swing in trend due to the influence of a regional stress field and the influence of another magmatic center that is active at the same time. All four major radiating swarms (of Ukemochi Corona, Tunehakwe Corona, Tamiya Mons and Tefnut Mons) all appear to swing into a WNW-SE trend away from their centres implying a regional stress of this direction during the emplacement of these four magmatic centers. Also, note that the four radiating swarms do not swing into each other (in particular, note how the Tefnut swarm crosses the swarms of Ukemochi Corona and Tamiya Corona.

Timelines: If these 4 magmatic centers were coeval, then they would swing into each other. The fact that they do not indicates a range in time for their emplacement--- implying that the WNW-SE stress was active for a period of at least millions of years (in comparison with swarms on Earth). This regional trend inferred in the Study Area aligns with the trend of Parga Chasmata, implying that Parga Chasmata was undergoing extension during the emplacement of these magmatic centers. This result matches the stress pattern at the other end of Parga Chasmata, 10,000 km to the east. The radiating swarm of Ozza Mons of Atla Regio, and in particular the Great Dyke of Atla Regio, swings 50° into parallelism with Parga Chasmata, indicating that this end of Parga Chasmata was also experiencing extension during emplacement of Ozza Mons of Atla Regio.

USING SPECIFIC PRIMERS IN PCR TO DISCERN DEER MICE FROM OTHER WILD MOUSE SPECIES

Celine Larose, *Honours Bachelor of Science in Biology*

Supervisor: Dr. Catherine Cullingham

Deer mice have been known to carry illnesses that can be hazardous to human health and other wildlife. The feces and urine of Sin Nombre virus (SNV)-infected deer mice can cause hantavirus pulmonary syndrome (HPS), a rare and life-threatening respiratory disease in humans. The purpose of the study is to use PCR to discriminate deer and white-footed mice for future analysis of deer mice for warfarin-resistance.

EXPLORING DATA-DRIVEN APPROACHES TO PATTERN AND FORM DEVELOPMENT IN DESIGN

Tracy Li, *Bachelor of Industrial Design*

Supervisor: Dr. Steven Pong

This study examines the potential of data-driven design in pattern-making and form development. It shifts the focus from traditional cultural or aesthetic influences to data itself, using visualization techniques like violin plots, Sankey diagrams, and heat maps to inform design. Artificial intelligence is employed to analyze sketches and identify patterns without cognitive biases, offering a repeatable method for translating abstract data into tangible design elements. A case study involving a furniture design project demonstrates how data visualization can guide form development, creating a coffee table inspired by a bar graph that captures the essence of a Canadian cottage experience. The research contributes to broader initiatives in computationally driven craft and product design, aiming to refine methodologies for systematically translating data into physical forms.

TRNT1 MUTATIONS IN SIFD: INVESTIGATING THE GENETICS OF A RARE CHILDHOOD DISEASE THROUGH YEAST

William (Avery) MacLeod, *Honours Bachelor of Science in Health Sciences*

Supervisor: Dr. Martin Holcik

Mitochondrial diseases are a diverse group of heterogenous disorders, often caused by mutations in the nuclear or mitochondrial genome, particularly in tRNA genes, affecting tRNA maturation. The CCA-adding enzyme is essential for modifying both nuclear and mitochondrial tRNAs, which are encoded by nuclear gene TRNT1. Loss-of-function mutations in TRNT1 can lead to a destructive disease called SIFD (Sideroblastic Anemia with B-Cell Immunodeficiency, Periodic Fevers, and Developmental Delay). Unfortunately, there is a lack of knowledge on which exact TRNT1 mutations cause the wide range of phenotypes associated with SIFD. Given TRNT1's essential role across species, yeast can serve as a model organism to screen for SIFD-associated mutations. This screening can be achieved by introducing plasmids carrying patient-derived TRNT1 mutations into yeast strains where CCA1 (yeast homologue of TRNT1) expression is regulated by an auxin degron system, inducing a degradation of the protein. The aim of this project was to use yeast as a model organism to identify the effect of TRNT1 mutations associated with SIFD phenotypes. The aim of this project was to use yeast as a model to assess the functional impact of TRNT1 mutations associated with SIFD. To achieve this, a primer design tool and a mutagenesis kit were used to introduce patient-derived mutations into plasmids. These plasmids were then transformed into *E. coli* for propagation. Following bacterial lysis, plasmid DNA was extracted and subjected to restriction digestion to confirm its size. Once validated, the plasmids were sent for sequencing. Upon confirmation of successful mutagenesis, the plasmids were transformed into yeast, where serial dilutions were performed using the auxin degron system to assess the effects of TRNT1 mutations on yeast viability.

OPTIMIZING AIRBORNE EFFICIENCY: DATA-DRIVEN INSIGHTS INTO AIRCRAFT FUEL CONSUMPTION

Talha Nawaz, *Bachelor of Engineering in Aerospace Engineering*

Supervisor: Dr. Jeremy Laliberté

This project presents a data analysis and simulation model designed to predict the fuel weight onboard an aircraft. By considering key parameters, such as aircraft model type, altitude, latitude, longitude, and speed, the model estimates fuel consumption at each flight timestep. The approach is grounded in the estimation methods outlined in *Gudmundsson's General Aviation Aircraft Design – Applied Methods and Procedures (2nd Edition)* and data used in the simulation comes from NAV CANADA's database of transponder-enabled flights, ensuring a strong foundation in real world applications.

THE BLISTERING WOUNDS OF YEZIDIS RESETTLING IN CANADA

Hafsa Omar, *Honours Bachelor of Arts in Psychology*

Supervisor: Dr. Gulay Kilicaslan

I conducted literature reviews and searches of documents pertaining to the genocide of Yezidis over the decades and their resettlement experience. We discovered that much of the existing literature focuses on their past, which shadows them as they resettle in their new home. They often have to relive their trauma by describing their experiences to researchers or recounting why they deserve support. We want to shift the narrative of Yezidis from victims to survivors. Our aim was to focus on how we can ameliorate resettling Yezidis' future by reading through government reports, news articles, and academic papers. My poster outlines the principal suggestions for supporting resettling Yezidis in Canada and can be generalized to support them wherever they may be relocated.

CA2 SPINE DENSITY IN AN IN-VIVO MODEL OF AUTISM SPECTRUM DISORDER

Tori Rock, *Honours Bachelor of Science in Neuroscience & Biology*

Supervisor: Dr. Matthew Holahan

Autism spectrum disorder (ASD) is a neurodevelopmental disorder, characterized by a wide range of social and behavioural symptoms. Pathophysiology of ASD in humans is highly variable, however, there are differences seen in spine morphology and density, specifically in the hippocampus. Treatment of ASD is limited, targeting only certain symptoms, through both pharmacological and non-pharmacological methods. Prenatal exposure to valproic acid (VPA) can create an animal model of ASD that shows similarities to the pathophysiology of ASD in humans. Using 3D neuron reconstruction software, neurons within the CA2 of the hippocampus were traced, and spines were quantified as thin, mushroom, or stubby, at a magnification of 100x. There were no significant changes observed in thin and total spine density between treatments, but a significant decrease in thin spine density in females was observed. A significant increase in stubby spine density and decreased mushroom spine density were observed in the VPA treatment group, but future studies are needed to further the development of viable treatment.

PLEOTROPIC EFFECTS OF ANTIBIOTIC RESISTANCE

Elizabeth Rogers, *Bachelor of Science in Biology and Biotechnology*

Supervisor: Dr. Alex Wong

Organisms like bacteria can mutate in order to be resistant to antibiotics or other stressful environments. These mutations are phenotypic, meaning they change a physical characteristic(s) of the organism. These mutations usually come at a cost, i.e., energy, motility. My project investigated whether these resistant mutations impacted their survivability in other stressful environments.

BEYOND THE CLASSROOM: EXPLORING OUTDOOR LEARNING IN CANADIAN SCHOOLS

Emma Simpson, *Honours Bachelor of Science in Neuroscience & Biology*

Supervisor: Dr. Tanya Halsall

Research has shown that children have better health and academic outcomes when outdoor, nature-based learning is integrated into their schooling. This project involved semi-structured interviews with policy makers, youth and educators about their experiences with outdoor learning. Analysis of the interviews revealed themes and the barriers and benefits of outdoor learning in schools.

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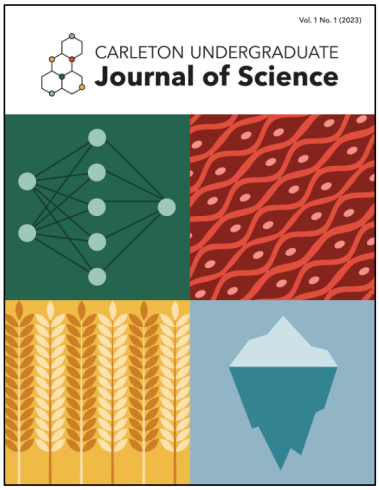
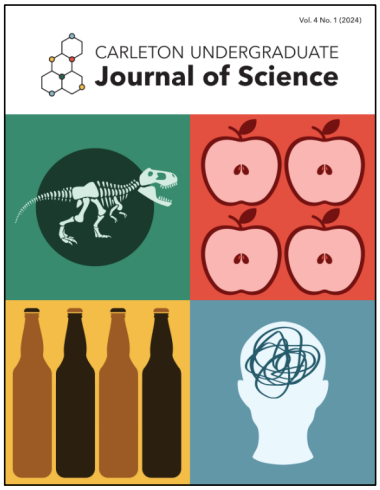
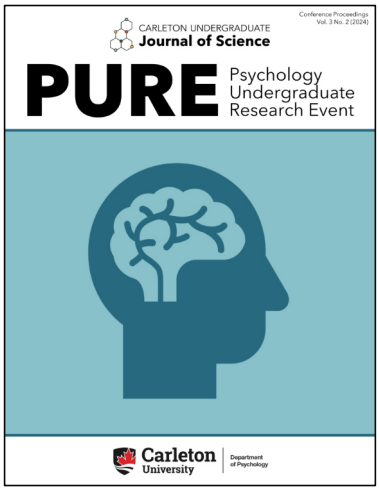


Vol. 1 No. 1 (2023)

Vol. 2 No. 1 (2024)



Vol. 4 No. 1 (2024)



Vol. 3 No. 1 (2024)

Vol. 3 No. 2 (2024)

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