Inquiry@Queen's

19th
Annual Undergraduate
Research Conference

Program

March 6 & 7, 2025
Douglas Library

queensu.ca/iatq

Welcome to Inquiry@Queen's!

It is with great excitement that we welcome you to the **19th Annual Inquiry@Queen's Undergraduate Research Conference**, a celebration of curiosity, innovation, and academic discovery. Organized by the Queen's University Library, with support from the Vice-Principal Research Portfolio, this conference provides an invaluable platform for undergraduate students to showcase their research, engage in meaningful discussions, and connect with peers and faculty from diverse disciplines.

At Queen's University, we believe that inquiry is at the heart of learning. Whether exploring new ideas, challenging existing perspectives, or finding creative solutions to real-world problems, this conference highlights the incredible work being done by our students. It is an opportunity to not only share knowledge but also to inspire and be inspired.

We encourage you to take full advantage of this event—ask questions, engage in conversations, and explore the breadth of research presented. Your participation fosters an environment of intellectual curiosity and academic excellence, making Inquiry@Queen's a truly dynamic experience.

The 2025 I@Q Conference consists of eight presentation sessions, two poster sessions, and a keynote lecture. We received a record number of submissions this year and our program represents the excellence and diversity of undergraduate research at Queen's. Following the conference, all abstracts will be published in the Inquiry@Queen's Undergraduate Research Conference Proceedings.

Once again, the two top oral presentations will be awarded the Vice-Principal Research Undergraduate Prize, which celebrates academic rigour, reinforces the commitment to teaching and research integration, and elevates the profile of undergraduate research at Queen's University. Each recipient will receive $1000 in recognition of their excellent research. Recipients will be announced after the conference.

Thank you for being part of this journey of discovery and for supporting undergraduate research at Queen's. We look forward to an engaging and thought-provoking conference!

Sincerely,

The 2025 I@Q Conference Planning Team:

Deirdre Bryden (Co-Chair), Archivist (University Records), Queen's University Archives
Bronwyn Jaques (Co-Chair), Project Coordinator, Vice-Principal Research Portfolio
Callie Houle, Information Services Technician, Bracken Health Sciences Library
Jane Reeves, Scholarly Publishing Coordinator, Stauffer Library
Courtney Svab, Health Sciences Librarian, Bracken Health Sciences Library
Shelley Woods, Education Librarian, Education Library

We recognize that Queen's University is situated on traditional Anishinaabe
and Haudenosaunee Territory and that it is a privilege to learn together on this land.

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Session A: Science & Engineering

Thursday March 6, 9:15-10:15 AM

The 1966 Reading Room, Douglas Library

Moderator: Bronwyn Jaques, Project Coordinator, Vice-Principal Research Portfolio

Engineering Hyperthermostable Nylonase, TvgC, to Improve Catalytic Efficiency for Degradation
Presenter: Mikaela Coleman
Faculty Supporter: Dr. Graeme Howe, Department of Chemistry, Queen's University

Nylons are too inert to be recycled in a cost-effective manner. The Howe Group's recent discovery of TvgC, a hyperthermostable amidase with the capability to degrade nylon, hints at an exciting possibility: sustainable biocatalytic nylon recycling. While experiments showed that TvgC degraded nylon at rates even greater than those achieved by the most highly engineered enzymes, significant improvements are still required to improve the catalytic efficiency of TvgC such that the protein can enable biocatalytic recycling on an industrial scale. This proposal will develop the directed evolution pipeline to facilitate the production of TvgC variants with increased catalytic efficiencies. We have already identified a method to force E. coli cells to overexpress and secrete TvgC into the surrounding media. This project will use nylon-doped agar plates harbouring many E. coli colonies, with each expressing one member of a TvgC mutant library generated by error- prone PCR and site-saturation mutagenesis. State-of-the-art ambient ionization mass spectrometry techniques will then be used to analyze the nylon-doped surface in the vicinity of each colony. Cells expressing TvgC variants with higher activities will exhibit more nylon degradation, and these cells can be isolated, so that variants of interest can be identified and further analyzed. By developing this on-plate selection method, this proposal has the potential to enable biocatalytic nylon recycling and to transform how directed evolution campaigns are carried out.

Optimizing the Enzymatic Reduction of Perchlorate for Oxygen Production on Mars
Presenter: Cameron DeBellefeuille

Perchlorate is a widespread environmental contaminant resulting from anthropogenic sources such as rocket fuel combustion and pyrotechnics. On Mars, perchlorate concentrations can be found up to 1% where they pose a dual challenge: endangering astronauts by disrupting thyroid function and contaminating water supplies. Despite the hazardous effects of perchlorate, it also offers a potential source of oxygen for extraterrestrial missions. These characteristics have led to synthetic biology efforts aimed at leveraging perchlorate metabolism for Mars detoxification and oxygen production. The enzymatic breakdown of perchlorate relies on chlorite dismutase (Cld), a key enzyme that catalyzes the conversion of chlorite into oxygen and innocuous chloride. Previous work has demonstrated that Cld

acts as the rate-limiting step in perchlorate reduction, leading to the accumulation of toxic chlorite and limiting its efficiency in both bioremediation and space exploration applications. To enhance Cld activity, this study employed a protein engineering approach combined with analytical genomics to identify and optimize key amino acid residues influencing enzymatic performance. By analyzing the nucleotide and amino acid sequences of Cld variants with differing reaction rates, we identified candidate residues for modification. Structural modelling using AlphaFold and molecular visualization with PyMol enabled us to predict the effects of specific amino acid substitutions on enzyme stability and catalytic efficiency. Optimizing Cld for increased efficiency has significant implications for both Mars missions and terrestrial water decontamination efforts. By accelerating perchlorate reduction and oxygen production, this research supports the development of sustainable life-support systems for space exploration while also improving bioremediation strategies on Earth. Future work will focus on validating engineered Cld variants in experimental settings to further refine their application in diverse environmental and extraterrestrial contexts.

Mechanistic Analysis of NADPH Auto-Oxidation in a Baeyer-Villiger Monooxygenase
Presenter: Sashun Erickson
Faculty supporter: Dr. Graeme Howe, Department of Chemistry, Queen's University

Introduction: Baeyer-Villiger monooxygenases (BVMOs) are a class of enzymes that catalyze the oxidation of ketones to esters and lactones. Since biocatalytic processes enable ester and lactone production under milder, more sustainable conditions than traditional oxidation, BVMOs offer a promising route to more sustainable ester and lactone production. Among these enzymes, ssnBVMO has emerged as a particularly promising biocatalyst due to its stability and ability to oxidize a wide variety of ketones. BVMOs require NADPH to catalyze oxidations, yet a major hurdle to their industrial use is their tendency to consume NADPH through "auto-oxidation." However, the mechanism of BVMO-catalyzed NADPH auto-oxidation remains unclear. This study employs steady state kinetic experiments with *ssn*BVMO and several mutants thereof to elucidate the catalytic mechanism by which this protein auto-oxidizes NADPH. By determining exactly how ssnBVMO catalyzes this undesirable process, this work aims to permit the development of next-generation BVMOs that are not plagued by the auto-oxidation of NADPH.

Approach: To elucidate the auto-oxidation mechanism of ssnBVMO, site-directed mutagenesis targeted amino acids predicted to bind or activate NADPH for auto-oxidation. Mutant variants were overexpressed in *Escherichia coli*, purified via immobilized metal affinity chromatography, and subjected to kinetic assays with NADPH to assess auto-oxidation activity relative to the wild-type enzyme.

Implications: Preliminary findings suggest that specific active-site residues play outsized roles in the auto-oxidation of NADPH. These results provide insight into the enzyme's catalytic mechanism, revealing potential avenues for rational engineering to improve its catalytic efficiency by limiting the

amount of NADPH auto-oxidation in ssnBVMO, and the wider family of BVMOs. This study's implications also extend to the development of other enzymes into biocatalysts for green chemistry applications, including pharmaceutical synthesis and fine chemical production. Ultimately, this research contributes to expanding the toolkit of biocatalysts available for environmentally friendly chemical transformations.

Bio-Inspired Polarization Compass
Presenter: Benjamin Potter

Many emerging technologies like autonomous driving, robotic agriculture, and drone control promise to improve safety and efficiency in multiple sectors, however they require high-precision navigation systems which are currently insufficient. Existing navigation approaches rely on the global navigational satellite system (GNSS) that is prone to failure when satellite connection is unavailable. GNSS signal loss occurs in dense urban areas, which makes vehicle localization a challenge. Perhaps more problematically, jamming devices that block GNSS signals are becoming increasingly accessible. These inherent problems have pushed researchers to investigate methods of augmenting GNSS navigation with additional sensors to improve its precision and robustness. One such augmentation is inspired by the biology of the desert ant. This ant uses adaptations in its eyes to extract navigational cues from polarized skylight. When light from the sun hits the atmosphere, it generates a uniform polarization pattern that can be used to develop and maintain a navigational plan. Our work begins by constructing a polarization compass (PC) from the biological insights found in the desert ant. We then consider three algorithms for extracting navigational cues from the skylight polarization pattern captured by the PC: Hough transform (HT), support vector machine (SVM), and linear regression (LR). We demonstrate that PC provides a heading estimation that is accurate to less than 1 degree, which is better than existing magnetic compasses. Our work shows that PC is an attractive augmentation for GNSS-based systems which may improve their performance under adverse conditions. In future work, the PC will be integrated with other sensors, including GNSS, to assess its performance under realistic conditions. This will be carried out in both terrestrial and aerial domains.

DEAP 3600: Flasher Events
Presenter: Aarchi Shah
Faculty Supporter: Dr. Phillipe Di Stefano & Dr. Fredrick Schuckman, Physics, Engineering Physics & Astronomy, Queen's University

The DEAP-3600 experiment employs a vessel filled with liquid argon to detect dark matter. When argon atoms are excited by particle interactions, they emit ultraviolet light, which is subsequently detected by an array of sensors surrounding the vessel. This emitted light is analyzed to identify the nature of the interactions. During this summer, I had the opportunity to work on hardware upgrades for the detector, aimed at enhancing the filtration process to reduce background counts. This experience allowed me to gain a comprehensive understanding of the detector's hardware components and to physically install

and assist in the installation of several key components. Following these upgrades, I analyzed a subset of the data collected by the detector during its vacuum stage. Utilizing tools such as DEAPDISPLAY, I conducted a detailed visual inspection of specific runs, manually categorizing events to improve our understanding and analysis of the data. This hands-on experience provided valuable insights into both the hardware and data analysis aspects of the detector system.

How Does a History of Exposure to Varying Concentrations of Salt Influence the Evolution of Salt Tolerance in Ceriodaphnia When Subject to an Acute LC50 Test?
Presenter: Taylor Keenan

Introduction: An increase of salinity in freshwater ecosystems can cause a loss of biodiversity and affect ecological function (Cañedo-Argüelles et al., 2016). Zooplankton are a key bioindicator when looking at the problem of salinization of freshwater environments. Evolutionary rescue is the "recovery and persistence of a population through natural selection acting on heritable variation" (Bell, 2017). This is relevant to my research because I am exploring evolutionary rescue within *Ceriodaphnia* populations; Specifically, I am researching salt tolerance within *Ceriodaphnia*. Thus, my research question is, "How does a history of exposure to varying concentrations of salt influence the evolution of salt tolerance in *Ceriodaphnia* when subject to an acute LC50 test?".

Methods: The *Ceriodaphnia* used for this project were acquired from a previous study done at the Prairie Wetland Research facility. The *Ceriodaphnia* were cultured in mesocosms of varying salt concentrations ranging from 22mg/L of Cl to 2000mg/L of Cl including two control mesocosms. To begin, I first collected an individual *Ceriodaphnia* from a respective mesocosm concentration and added it to a test tube with COMBO media. I then repeated this so that I had 10 test tubes with a singular *Ceriodaphnia* from a single tank; This was done for each tank. To determine the evolved tolerance of *Ceriodaphnia*, I will be using acute 48 hours LC50 tests. The *Ceriodaphnia* will be tested at seven different salt concentration levels. To know if there is an evolved tolerance I will use the R package 'drc'.

Implications: This research is important as it can inform policy and decision-making practices surrounding environmental health within governmental bodies. Additionally, by understanding the evolved tolerance of freshwater organisms, we can use the information to begin remediation efforts. I expect that the outcomes of this research will exemplify that *Ceriodaphnia* are able to evolve a tolerance to salt with a history of exposure.

Session B: Humanities

Thursday March 6, 10:30-11:45 AM

The 1966 Reading Room, Douglas Library

Moderator: Nicole Kapphahn, Teaching & Outreach Archivist/Librarian

Riot Grrrls: Feminist or Elitist?
Presenter: Abagail McIntyre-Tsiang

Since the emergence of punk in the 1970s, the genre had always been at best almost completely male-dominated, and at worst, a tool of misogyny. In 1990, Riot Grrrls forced their way onto the scene in a blaze of feminist rage. Although there had been women in punk before the 90s, the Riot Grrrl movement signified the intentional and specific synthesis of punk and feminism (Jacques 2001). On both a lyrical and grassroots action level, the Riot Grrrl movement empowered femininity and attempted to sever punk from the patriarchy. This paper will analyze the success of these strategies and determine to what extent Riot Grrrls succeeded in their mission of feminine empowerment, where they failed, how they interacted with the mainstream, and how they were often exclusionary. Drawing from interviews with prominent Riot Grrrl artists, the focus of this paper will be how Riot Grrrls treated their demographics, how they either valued or diminished femininity, and how the movement impacted individuals and society.

Although the Riot Grrrl movement advanced feminism in many essential ways, including reclaiming femininity, breaking down the male domination of the punk scene, and speaking out against oppression in all forms, the movement often fell short in practicing the revolutionary inclusion and acceptance they preached. Whether consciously or subconsciously, the movement at times excluded people of color, people of different body shapes, and queer people. Overall the movement took an important stand against oppression and should continue to be celebrated and nurtured, though with a critical eye on how the movement can be exclusionary.

Enlightened Savages: An analysis of the influence of Wendat politics and social structure on European Enlightenment thinkers
Presenter: Joshua Kautto
Faculty supporter: Dr. Andrew Jainchill, Department of History, Queen's University

This paper examines the relationship between the society of the Wendat and its influence on the ideas of notable enlightenment thinkers: John Locke and Jean-Jacques Rousseau. Much is known about the atrocities committed by imperial administrations during the colonial period, but the epistemological violence carried out is often neglected. As normative western perceptions of the Wendat devalue their political apparatus and society, I pursue evidence to support the idea that certain Enlightenment thinkers were aware of the Wendat and used them as inspiration for the works they would produce that would become so revered within the scope of Western thought.

In this context, the work of Gabriel Sagard becomes essential in my research and the products of my paper. Sagard was one of many missionaries sent to New France who published accounts of his experiences in Canada for popular consumption back in France. Sagard's accounts are significant in their depictions of the Wendat and there are frequent mentions in the notebooks of John Locke to the work of Sagard and his analyses of the Wendat society that was depicted. Within this, connections can be made between the worlds of the Wendat and the Enlightenment that build the basis for my examination and work.

With this research, what I seek to convey is not only some aspect of the untold history of the Wendat, repressed by colonial epistemological violence, but also the introduction of a new, globalist, perspective to the Enlightenment paradigm that allows for broader understandings of the period at large. So much more can be gained from understandings of Locke or Rousseau if there is knowledge of where their ideas drew from, and equally, novel perspectives and treatments of what Enlightenment thought can be produced and evaluated. As the globalist history initiative has cemented itself within the academic fabric of Queens, this work follows that thinking and reintroduces the Wendat as Enlightenment figures.

Drawing Heritage Façades from 3D Data: Reprocessing LiDAR and Photogrammetry Datasets from OpenHeritage3D
Presenter: Esmond Lo (Lo Chung-Ting)
Faculty supporter: Dr. George Bevan, Department of Geography & Planning, Queen's University

Façade documentation requires detailed drawings that illustrate the dimensions, locations, conditions, and materials of a building exterior. This documentation aims to provide a guide and record for assessing, monitoring, preserving, and restoring built heritage. In 1858, a Prussian architect, Albrecht Meydenbauer, nearly fell while taking direct measurements at a building façade. This incident motivated him to develop an indirect measurement method called photogrammetry to record built heritage façades using a photographic camera and surveying instruments. In the era of analogue photogrammetry, photographic films and other equipment were costly. Consequently, such photogrammetric documentation projects required careful planning and skilled personnel. In the 21st century, the cost of personal computers and digital cameras reduced significantly. Collecting large amounts of data has become relatively inexpensive. Meticulous planning in photogrammetric projects has been de-emphasized, and tools like digital cameras, LiDAR scans, and UAVs have significantly increased the volume of unstructured data collected. CyArk, a non-profit organization based in California, has documented heritage sites globally using a combination of LiDAR and photogrammetry and published their datasets through the OpenHeritage3D portal, an open-access platform. However, these datasets often lack proper description, documentation, categorization, standardization, and modularization. Although these data can create photorealistic models, they do not contain surveying data and are too large to process for most personal computers. This project proposes a workflow for reprocessing these LiDAR and photogrammetric datasets produced by CyArk using widely available

software like RealityCapture, AutoCAD, AutoCAD Raster Design, and the Bulk Rename Utility. The objective is to deliver traditional 2D façade documentation from LiDAR and photogrammetric data required for heritage conservation projects and to create guidelines for the future collection and storage of such large building documentation datasets. Preliminary results show that more emphasis should be placed on metadata, georeferencing, and data organization than has hitherto been made.

Re-evaluating the Path to Rehabilitation Through Inclusion: Education at the Prison for Women, 1965- 2000
Presenter: Chelsea Lam
Faculty supporter: Dr. Steven Maynard, Department of History, Queen's University

As a fourth-year History and Concurrent Education student and a Kingston Penitentiary tour guide, I was drawn to write a historical narrative about education at the former Prison for Women (P4W) after conversations with colleagues who were former correctional officers. While embarking on this research project, I recognized that an annotated research guide would be best considering the topic's understudied nature and dispersed sources.

This research guide serves as a resource for individuals studying the history of education at the P4W in Kingston, Ontario, from 1965 until its decommissioning in 2000. It divides education at the P4W into three categories: academic, vocational, and recreational. As the only federal institution for women in Canada during this period, the P4W operated within a correctional system primarily designed for male inmates. Consequently, educational programs for women were limited, often replicating those in male institutions without adaptations to accommodate the unique and complex needs of female offenders.

Despite extensive research on male penal institutions in Canada, the role of education as a rehabilitative tool for incarcerated women remains understudied. This guide addresses that gap, focusing on a period marked by significant prison education reforms at the P4W and the broader prison system. It compiles diverse perspectives, centring the often marginalized voices of inmates who directly experienced these programs. This guide includes newsletters from the P4W and the Correctional Service of Canada (CSC), articles from Queen's University's *Queen's Journal*, interviews with former P4W educators, government reports, and other primary and secondary sources. By juxtaposing the official narratives of CSC with the lived experiences of inmates, educators, and observations of visitors, this guide provides a more nuanced understanding of education at the P4W. The purpose of this guide is to support and inspire further research on the history of prison education for women in Canada.

Demonology, LARP and Rituals. A study into if the world has become more disenchanted
Presenter: Emma Johnson
Faculty supporter: Dr. Sharday Mosurinjohn, School of Religion, Queen's University

Has our world become more disenchanted, and overall become less weird, as the study and belief in magic becomes more uncommon, is it safe to assume that society as a whole has become more scientific and that the influences, ideas, and practises of magic are something of the past. This research would argue against this, suggesting instead that ideas about magic are still very present and influential in today's society.

Looking at popular cultural and the influences that ideas about magic have had on it. This paper looks into how the practice of demonology has been represented, with specific focus on live action role play (LARP) systems. Looking into how demonology has been represented in these systems, and how similar or different it is. If inspiration for elements of the LARP system have been taken from real elements of demonology.

To conduct this research first a content analysis was done, using a variety of sources from both demonology and LARP systems. Such things as interviews, writings, and photos. Allowing the second part of this research, which was to conduct a ritual. As rituals are a key part in both demonology and LARP this felt like the best method to understand them by gaining firsthand experience through conducting a ritual using elements of both ideas.

From this it has been seen that gaining firsthand experience through conducting a ritual allowed the expansion of knowledge gathered during the content analysis. The findings of which are that the world still is very much a weird and odd place, elements of magical beliefs and practises are still very much alive and well, and their influences can be seen upon our popular culture. The similarities between demonology and LARP systems demonstrates that magic is something that is very much alive in today's society.

For Interpretation: A Defence of Authorial Intent in an Increasingly Technological World
Presenter: Annika Frankiss

Theories of authorship contend to identify the source of meaning in writing. Susan Sontag, in echoes of Barthes, provides an indictment against seeking predetermined meaning in a text, arguing to dissolve stifling critiques of content into sensuous appraisals. This position can no longer hold: insofar as the category of the human is destabilized by artificial intelligence, the process of interpretation must uphold considerations of authorial intent. In the first section of this paper, I put forward a defence of Hannes Bajohr's "causal authorship" model of authorship with a few altercations. Namely, I synthesize the causal authorship model, which constructs degrees of distance between the human author and resultant text, with the distributed author model, which sidelines the primary author for an actor-network, including non-human authors. I retain the concept of a primary author while allotting room to the actor-network. In the second section, I argue that a model of authorship must retain a primary author to allow for critical engagement (viz. close-reading, historical contextualization, and value

debates). I explore how the model of authorship we uphold manifests in our engagements with texts, contrasting the causal model with Sontag's approach. My position is such that if we adopt the post-structuralist conception, then we forfeit our capacity for criticism. In the third section, I illustrate how critical engagement is necessary in distinguishing literature produced by AI and humans. I compare authorship in LLMs (Large Language Models) and AGI (Artificial General Intelligence), resolving the coder holds primary authorship in the former, and the machine in the latter. I finally provide an opt-out mechanism for those seeking sensuous engagements with art, such that my position allots permissibility to both forms of engagement. I ultimately conclude that we ought to permit interpretation to account for the arising nuances of authorship in our technological world.

Beach Combing - Intuition as Inquiry
Presenters: Sophia Herrington, Emma Poley, Fiona McMillan, Maevis Chamberlain

Description: Artistic inquiry is often the basis for creating a work of art, and is done intuitively for artists of all practices. Four artists will share their artistic process from initial inspiration, to research, to artistic creation. How artists approach intuitive art making is not taught in creative institutes, yet remains the backbone of the artistic process. In our own personal practices, we are able to cultivate an idea using inquiry as a vehicle for intuitive creation. Informing our process with research allows us to bring artistic creation into a structured academic setting. Through modes of learning embedded in our institution, intuitive processes have not been taught, they have been discovered and grown on our own. Each artist will speak to how their practice relates to intuitive inquiry process by answering the following:

- How do you think of artistic creation as a form of intuition?
- How do you apply your artistic instincts to your medium of choice?
- What inspired the specific piece of art?
- Explain your intuitive process used to create the artwork.

Poster Session I (Lunch with Posters)

Thursday, March 6, 11:45 AM – 1:00 PM

The 1966 Reading Room, Douglas Library

Older Adult's Access to Care in Canada
Presenter: Charli Abitbol
Faculty supporter: Dr. Mark Rosenberg, Dept. of Geography & Planning, Queen's University

Since the 1990s, health experts have warned Canadian federal and provincial governments that the growing older population would increase pressure on the healthcare system. This study examines the state of older adults (aged 65 and over) before the COVID-19 pandemic to determine whether they faced more significant challenges in accessing healthcare services than younger adults. Microdata from the 2017–2018 Canadian Community Health Survey (CCHS) was analyzed using chi-square tests and crosstabulations for this research. The findings indicate that older adults report better health outcomes and greater access to healthcare services than their younger counterparts. However, it is crucial to note a significant limitation of the CCHS. It only collects data from individuals in community settings and excludes those in institutionalized settings. This exclusion is important because older adults in long-term care facilities typically experience poorer health and may face more substantial access barriers. As a result, a vital segment of the older population is missing from this analysis. The results might also reflect processes related to younger adults who need to find primary care physicians for the first time and/or the challenges that younger adults face as they move from one labour market to another. Further research is needed to thoroughly examine the health and accessibility challenges faced by all younger and older adult residents in Canada.

[18F]-FDG CT and PET Scans in a Monocrotaline Rat Model to understand the role of the brain in Pulmonary Arterial Hypertension Development
Presenters: Naiya Chhelavda, Noor Ajel, Swetlana Kumar, Luca Manconi, Sarah Rosenbaum
Faculty supporter: Dr. Charles Hindmarch, Depts. of Medicine, Biomedical & Molecular Science, Queen's University

Introduction/Problem statement: Pulmonary arterial hypertension (PAH), classified as Group 1 pulmonary hypertension is a rare, progressive disease with a 50% survival rate. Common symptoms include dyspnea, fatigue, and lightheadedness. The fatal effects of the disease occur because of right ventricular failure exacerbated by elevated mean arterial pressure and chronic pulmonary vascular resistance. The role of the brain in PAH is not well understood, however elevated sympathetic nerve activity implicates the baro- and chemo-flex, physiological mechanisms that modulate sympathetic tone through changes in pressure, and blood chemistry respectively.

Methods/Approach: Sprague Dawley rats were separated into treatment and control groups, receiving 60mg/kg subcutaneous injections of monocrotaline (MCT) or phosphate buffer saline (PBS), respectively. Rats then underwent echocardiography to confirm the onset of PAH. Under isoflurane anesthesia, [18F]-FDG was administered intravenously, which was utilized by metabolically active cells. Using a Tri-modality scanner (Mi Labs; Netherlands), CT and PET scans were acquired so that a protocol to assess the metabolic differences between MCT and PBS control rats can be optimized so that differences in tissues such as the heart and brain can be assessed.

Findings/Implications: This research aims to provide pilot data which will help to optimize CT and PET scanning using [18F]-FDG in rats with PAH compared to normotensive controls. Our findings will help inform future studies that rely on these data as end-point measurements and so enhance our understanding of PAH mechanisms, ultimately guiding future research and treatment strategies.

Association as a Conduit of Blame
Presenter: Alexandra Culbert, Ella Hands, Anisha Imtiaz
Faculty supporter: Dr. Stanka Fitneva, Department of Psychology, Queen's University

A range of phenomena - from wrongful convictions to family vendettas – suggest that blame and punishment sometimes target individuals who are not involved in wrongful acts. However, dominant causal theories of blame often fail to explain this. In the present research we go back to Heider's (1958) proposal that association is the first, most-basic mechanism for attribution of responsibility, examining whether the existence of social association on its own could allow for blame to spread.

We presented 101 university students with stories featuring a character who was in the same group as the perpetrator of a harmful deed and a character who was not. Both characters were depicted as uninvolved and unaware of the harm. A third group member was an accomplice of the perpetrator. Groups were either presented as being close knit (high in entitativity) or organized ad-hoc (low in entitativity), allowing us to examine how strength of affiliations influence on the spread of blame. Participants rated the victim's anger towards each character. Our key hypotheses posited that (a) uninvolved group members would incur more blame for a harmful act than uninvolved non-group members, (b) this difference in blame attribution would be greater in groups with high entitativity.

As expected, the accomplice was blamed less than the perpetrator, and the group member and the non-group member were blamed less than the accomplice. However, consistent with the associative proposal advanced by Heider, participants attributed more blame to the uninvolved group member than the equally uninvolved non-group member. The difference was significant in the high but not in the low entitativity condition. These findings provide strong evidence for the role of non-causal social association in the spread of blame, calling for the expansion of current models of blame attribution to incorporate purely associative pathways.

Identifying Holistic Admissions Practices in Health Sciences Programs in Canada for Equity-Deserving Groups: A Scoping Review Informing Admissions Guideline Development at Queen's Health Sciences

Presenter: Haley Kombargi, Sophia Baldasaro, HanShu Pu
Faculty supporter: Dr. Giselle Valarezo, Queen's Health Sciences (QHS), Queen's University

Many Canadian health sciences programs have committed to increasing inclusive admissions. Yet, equity-deserving groups – including individuals who identify as Indigenous, racialized, female, 2SLGBTQI+, and those from low socioeconomic or rural backgrounds – remain underrepresented. In alignment with the Queen's Health Sciences (QHS) Equity, Diversity, Inclusion, Indigeneity, Accessibility (EDIIA) Action Plan, this scoping review aims to identify best practices for enhancing holistic admissions of individuals from equity-deserving backgrounds to better reflect and serve patient populations in Canada. The primary research questions explored are: I) what evidence-based and equity-informed admissions practices support the enrolment of equity-deserving groups in health sciences undergraduate and graduate programs in Canada; II) how are transparent and holistic admissions practices implemented in health sciences programs to support equity-deserving groups; and III) how can these admissions practices inform the development of guidelines to enhance the admissions of equity-deserving groups across QHS programs. We included literature surrounding EDIIA-based admissions processes in health sciences programs in Canadian universities. Suitable literature includes proposed interventions, case studies with tested interventions, reviews of existing practices, and data that has been collected through interviews, surveys, and student feedback. Relevant references were extracted from ERIC, CINAHL, MEDLINE, and EMBASE and are being screened using Covidence. A grey literature search was completed by the faculty supervisor using Google's Advanced Search. Data extraction by at least two reviewers will commence and be followed by manuscript drafting. In alignment with the QHS EDIIA Action Plan, the results of this study can inform best practices for implementing holistic admissions processes at QHS, ultimately fostering diverse healthcare workforces. Through conducting a scoping review with a fourteen person working group, we hope to capture a broad range of perspectives and lived experiences, embodying qualities of diversity and inclusion that we aim to embody throughout the research process.

Fungal Amalgamation for Enhanced Soil Fertility in Northern Ontario: A Community-Based Strategy for Indigenous Communities' Food Security

Presenters: Niki Moshirfatemi, Zara Khan, Manisha Sharvananthan

This proposal explores the potential of fungal amalgamation and Community-Based Participatory Research (CBPR) in addressing food insecurity among Indigenous communities in Northern Ontario.[1] For Indigenous Peoples, cultivating and sustaining traditional food systems is deeply intertwined with cultural identity, a reciprocal relationship nurturing the land and community.[2] However, forced relocations in the 1950s severed many communities from their ancestral lands, often moving them to areas with poor soil quality and harsh climatic conditions. In Northern Ontario, much of the land

consists of fibrisol soils, which are highly acidic, nutrient-deficient, and prone to waterlogging; this creates significant barriers to farming. With limited access to arable land, many Indigenous communities rely on expensive, low-quality imported food, highlighting the need for locally driven solutions.3 Fungi, as primary decomposers, break down organic matter and facilitate nutrient cycling, making them a key factor in restoring soil fertility..4

This study adopts a two-pronged approach: utilizing CBPR to develop a culturally informed understanding of food insecurity and exploring fungi to solve this poor agricultural yield in sub-arctic communities. Using mycology as an innovative strategy, this research investigates the potential of fungal inoculation to enhance soil quality, crop resilience, and overall agricultural sustainability. A controlled greenhouse study will introduce fungal spores from psychrophilic, arbuscular mycorrhizal, and saprophytic fungi into fibrisol soil to assess their impact on crop yield, drought tolerance, and soil structure.

Preliminary findings from greenhouse trials are expected to demonstrate the effectiveness of fungal inoculation in enhancing soil viability. These insights can inform larger-scale agricultural initiatives tailored to the unique needs of Indigenous communities. Furthermore, this research reinforces the importance of reconnecting Indigenous communities' relationship with their land. Integrating mycology into food security strategies offers a culturally relevant contribution to ongoing reconciliation efforts: supporting Indigenous food sovereignty whilst advocating for sustainable, community-led practices.

Black Women's Silent Battle with Eating Disorders: Exploring Eating Disorders Among Black Women and the Barriers to Recognition and Treatment
Presenter: Tyra Obadan

An eating disorder is a complex mental illness that manifests through disordered eating habits and behaviors. Awareness concerning disordered eating behavior has increased within the last decade; Eating disorders have often been primarily associated with affluent white women, even though women of all races and socioeconomic backgrounds are affected. Black women, in particular, tend not to appear in mainstream discussions due to cultural narratives and treatment frameworks. This study will examine the barriers that Black women encounter in acknowledging and treating eating disorders including sociocultural implications, and medical bias.

In pursuing a mixed-method approach, data collection from structured interviews with 30 Black Canadian women 18-40 years of age was combined with a secondary analysis of existing research literature on eating disorders and racial disparity in mental health care. This analysis takes into consideration the cognitive effect of societal expectations of women's bodies and institutionalized medical bias, both of which contribute to underdiagnosis and misrepresentation of eating disorders in Black women.

Preliminary findings indicate that stereotypes surrounding Black women's bodies, combined with cultural attitudes toward food and weight, significantly obscure Black women's experiences with mental health care. Culturally competent interventions that include and advance recognition, prevention, and treatment strategies need to focus on Black women's experiences with urgency. Closing these disparities will strengthen efforts toward a more equitable and nuanced understanding of the detrimental effects of eating disorders on Black women. In the long term, this study aims to convey the need for increased access to treatment and dialogues around the intersection of health, race, and gender.

Bridging Belonging: Analyzing Student Perceptions of Inclusivity at Queen's University: A Comprehensive Observational Study on Student Experiences Through an EDIAA Lens
Presenter: Luka Parikh, Keshvi Vithlani, Shayan Raeisi Dehkordi, Roshni Perera
Supported by: Faculty of Health Sciences, Arts and Science Undergraduate Society (ASUS), Queen's University

Background: With a rapidly evolving demographic in the student body at Queen's University, this study explores the ways students conceptualize inclusivity, both positively and negatively, and examines its implications in their academic and social experiences. This study was developed using the EDIIA framework defining inclusivity as the degree individuals from diverse backgrounds feel welcomed, respected, and supported within the Queen's community.

Methodology: A survey-based observational study was completed, sampling 50+ students from the Queen's University community from all degree programs and years of study. The survey was shared online using Instagram and in-person at the TEDxQueensu Conference and Student Life Centre. Students were asked to anonymously complete the survey using Microsoft Forms. The survey consisted of 16 questions both qualitative and quantitative, incorporating Likert Scales and open-ended responses. The survey was designed to assess student demographic factors as well as their sense of inclusivity within Queen's university.

Results: Preliminary analysis indicated mean participant age was 19 years, with a modal age of 18 years. The most represented faculties were Health Sciences, and Arts and Science, with a notable proportion of respondents identifying as second-generation university students. Anticipated themes include faculty-based variations in inclusivity perceptions, cultural background influences on social belonging, and disparities in academic engagement. Responses will be analyzed to assess frequency and impact of experiences with microaggressions, exclusionary behaviors, and barriers to cross-cultural interactions on campus inclusivity.

Significance: By identifying both systemic strengths and areas of exclusion related to inclusivity at Queen's, we hope our findings will serve as a catalyst for driving meaningful change that bridges existing gaps within the campus community. Beyond highlighting student perspectives, this research has the potential to inform targeted EDIIA initiatives, reshape institutional policies, and drive cultural

transformation in the Queen's community, ultimately fostering a more supportive and safe environment for all students.

Erythrocyte Omega-3 Index as a Biomarker for Skeletal Muscle Omega-3 Composition: A 22-Week Study
Presenters: Brendan Ross, Callum J. Pufahl, Sydney E. Smart
Faculty supporter: Dr. Chris McGlory, School of Kinesiology & Health, Queen's University

Omega-3 fatty acid supplementation has been shown to positively influence various biological processes including immune function, cognition and neuromuscular performance, with recent evidence suggesting beneficial effects in human skeletal muscle. Measurement of omega-3 fatty acids in skeletal muscle requires skeletal muscle biopsies that are invasive and require specialized training. In contrast, measurements of erythrocyte and plasma omega-3 saturation require minimally invasive venous blood draws. This novel analysis, conducted as part of a larger study (, investigated the correlation between the relative abundance of eicosapentaenoic acid (EPA; 20:5n-3) and docosahexaenoic acid (DHA; 22:6n-3) in human skeletal muscle, red blood cells and plasma. Using a repeated measures design, 15 females and 14 males supplemented 5 g/d of EPA+DHA (3.2 g EPA; 1.8 g DHA) for 8 weeks followed by 14 weeks of washout. Skeletal muscle biopsies and venous blood draws were obtained at weeks 0, 6, 8, 16, 20, 22. Analysis revealed a strong correlation between EPA in skeletal muscle and erythrocytes at week-0 ($p < 0.001$; $r^2 = 0.721$) which weakened over the supplementation and washout periods. For DHA, there was a moderate correlation at week-0 ($p < 0.001$; $r^2 = 0.505$) which remained consistent through the 22-week course. For EPA+DHA, there was a strong correlation between skeletal muscle and erythrocytes peaking at week-8 ($p < 0.001$; $r^2 = 0.813$), before weakening slightly throughout the washout period. Finally, there was no significant association between skeletal muscle and plasma levels throughout the supplementation and washout periods. This analysis provides insights into the association and incorporation of the omega-3 fatty acids EPA and DHA on a tissue-dependent basis. Our results suggest that the Omega-3 Index (EPA+DHA) may be a useful, non-invasive bio-marker of skeletal muscle omega-3 composition during supplementation.

Assessing the Efficacy of Risk Communication on the Knowledge, Awareness, and Beliefs of Human Papillomavirus among Women in Tanzania
Presenter: Meara Sanjayan
Faculty supporters: Drs. Karen Yeates, Department of Medicine; Melinda Chelva, Biomedical & Molecular Science, Queen's University

Objective: To assess the efficacy of risk communication on the awareness, knowledge, and beliefs of HPV and its link to cervical cancer among women aged 25 to 49 in Tanzania as well as to explore the association between HPV awareness and demographic characteristics.

Materials and methods: This study was conducted among women aged 25 to 49 recruited from the Kilimanjaro Christian Medical Centre. Women were offered HPV self-sampling after risk communication via verbal explanation, an educational video on cervical cancer and HPV, as well as an animation that explains the process of HPV self-sampling. If HPV self-sampling was accepted, participants completed an exit survey to assess their knowledge, awareness, and beliefs about cervical cancer, HPV, and the relationship between the two after performing the procedure. If HPV self-sampling was declined, participants would have completed a different survey used to investigate the reasons for declining the procedure.

Results: A total of 150 women were recruited and self-collected an HPV self-sample. The exit survey had a 100% response rate. Few women (34.2%) reported having heard of HPV, with no significant difference between rural and urban areas. More than 80% of women in both rural and urban populations did not know that a positive screening test does not mean cancer, that there are outpatient treatments that can help prevent the progression of HPV into cervical cancer, and that HPV infections can be asymptomatic. There was a significant association between education level and awareness of HPV (p=0.002).

Conclusion: The knowledge and awareness of HPV and its link to cervical cancer was poor among both the urban and rural population groups even after risk communication was performed. These results reflect the need to gain the perspectives of the women to both optimize and determine the efficacy of risk communication.

Keynote Lecture

Thursday, March 6, 1:00-2:30 PM

The 1966 Reading Room, Douglas Library

Moderator: Mark Swartz, Scholarly Publishing Librarian

Are We All Treaty People? Building Research with Students

Presenter: Dr. Laura J. Murray, Department of English and Cultural Studies Graduate Program, Queen's University

In this talk I will discuss my experience integrating teaching with research. Often professors find teaching and research compete for our time because our courses are not at all on the same topics as our research. In 2012, I found myself puzzling over the slogan "We are all Treaty People" coming out of the Indigenous rights movement Idle No More. I asked myself what I thought would be a simple question: "Am I? is there a treaty for Kingston?" But this question wasn't in fact easy to answer, and thus began a ten year research project. I was lucky to have funding from the Principal and support from my Department Head to begin to work through these questions via the course Unsettling Kingston/Katarokwi, which was a very satisfying process, and the reverse of the usual expectation that the professor figures everything out and THEN teaches it.

Laura J. Murray is a Professor in the Department of English and recently completed a 4-year term as Co-Director of the Graduate Program in Cultural Studies. Her work on Kingston's "Crawford Purchase" loops back to her first book (1998) on the writings of a young Mohegan man from Connecticut who in the midst of the American Revolution advocated for land for his dispossessed people. In the interim she has written extensively on language and North American colonization, and on nineteenth-century American newspapers and urban life. Her work on copyright law ranges from practical public engagement (*Canadian Copyright: A Citizen's Guide*, with Samuel E. Trosow, Between the Lines 2007, 2013) to theoretical and historical perspectives (*Putting Intellectual Property in its Place*, with Kirsty Robertson & Tina Piper, Oxford 2014). As an oral historian she created and led the Swamp Ward and Inner Harbour History Project about an immigrant working class neighbourhood north of Princess Street (swampwardhistory.com). Currently she is co-lead on the SSHRC-funded Belle Park Project, using art, film, and various forms of community engagement to illuminate a complex space on the Cataraqui River (belleparkproject.com).

Session C: Geography

Thursday, March 6, 2:45-4:15 PM

The 1966 Reading Room, Douglas Library

Moderator: Dr. Neal Scott, Department of Geography and Planning, Queen's University

Changes in Diatom Assemblages in Canoe Lake: Climate Change and Watershed Influences
Presenter: Jasmine Boyd
Faculty supporter: Dr. Neal Scott, Geography & Planning, Queen's University

Long-term sediment records from lakes provide a valuable historical perspective for comparing recent environmental changes with past conditions. This study reconstructs the environmental history of primary production and nutrient dynamics in Canoe Lake, located adjacent to the west side of Frontenac Provincial Park, Ontario. Although minimally impacted today, Canoe Lake was historically affected by settlement-related disturbances, including logging and damming. It is classified as oligotrophic, with low phosphorus levels (<10 µg/L), and supports a natural Lake Trout population. A paleolimnological approach was used to reconstruct past environmental conditions by dating the lake core and analyzing the diatom assemblages preserved in the lake sediments as proxies of changes in primary production and past levels of nutrients. Diatom species assemblages were identified and analyzed to determine whether shifts occurred over the past ~200 years and if these changes correlate with known watershed disturbances. I hypothesize that shifts in diatom assemblages will reflect changes in primary production due to both anthropogenic and natural forces. The findings will contribute to ongoing research efforts to understand how ongoing climate change has impacted primary production in aquatic ecosystems in the region, specifically in Trout lakes.

Ice Darkening on Turner Glacier in Auyuittuq National Park, Nunavut: A Characterization of Surface Algal Blooms and the Associated Implications for Glacier Albedo and Melt
Presenter: Carolyn Gorwill

The Arctic is the largest regional source of land ice to global sea-level rise, composing 31% of the global eustatic sea-level contributions since 1992. Within the Arctic, the glaciers of the Canadian Arctic are the third largest contributor. The presence of light absorbing particles (LAPs) on glaciers, such as mineral dust, ash, and algae, have been shown to lower the albedo of ice, leading to an increase in the absorption of incoming solar radiation, promoting melt. While surface algal blooms and their albedo-reducing effect has been quantified on glaciers in western Canada, Alaska, the European Alps, and southwestern Greenland, it is currently unknown if, or to what extent, either of these phenomena are occurring in the Canadian Arctic.

This study employs light microscopy and field spectroscopy to characterize surface algal blooms found on Turner Glacier in Auyuittuq National Park, Nunavut, and to evaluate the associated effect on albedo. From ice samples, an average algal cell abundance of 6.1 x 10^4 cells/mL was found, with *Mesotaenium berggrenii* as the dominant species, followed by *Ancylonema nordenskioeldii,* among the six identified

species. Additionally, a significant negative relationship between broadband albedo and algal cell abundance (R^2 = 0.67, p = 0.0001) was observed, confirming, for the first time, that the algal-albedo effect is occurring in the Canadian Arctic.

The relationship between cell abundance and spectral reflectance was quantified by integrating cell counts with in-situ spectroradiometer measurements (320nm-1100nm), to develop a field-calibrated, remote sensing index. When combined with satellite imagery from the MultiSpectral Instrument (MSI) aboard Sentinel-2, this index will support the future large-scale mapping of glacier algae.

Together, these findings fill an important geographical knowledge gap that will inform and improve the characterization, remote detection, and monitoring of surface algal blooms on glaciers in the Canadian Arctic, and their implications for albedo and melt.

What Compels People to Take Action for Nature: A Case Study of the Crowsnest Pass Conditions, Strategies, and Lessons for Conservation

Presenter: Brittney Balcaran

Faculty supporter: Dr. Graham Whitelaw, Geography & Planning, Queen's University

As Alberta reopens the Eastern Slopes to coal mining, many communities are alarmed by the risks to their livelihoods and the environment. This study investigates what motivates people to take action by examining the informal network of stakeholders in the Crowsnest Pass region who united to oppose coal mining. We used a qualitative, inductive approach that included a literature review, document and media analyses, and semi-structured interviews with community members, ranchers, environmental organizations, and other stakeholders. Our goal was to identify the conditions, strategies, and lessons that helped this effort succeed.

Our findings highlight three main factors. First, a sense of urgency grew when people realized the possible threats to water quality, wildlife, and community well-being. Second, a strong emotional connection to the landscape, often passed down through generations, sparked initial participation. Finally, even without a formal coalition, different groups shared resources and coordinated their messaging, supported by targeted media outreach that helped them gain public attention.

Overall, this case shows how place attachment, perceived environmental risk, and collaboration rooted in trusted relationships can drive meaningful action. These insights will guide the Crowsnest Pass community, which now faces renewed pressures from ongoing policy changes. They also offer a practical roadmap for conservation organizations aiming to replicate similar approaches. Future research should examine how these strategies adapt in different social and political contexts, deepening our understanding of community-driven advocacy for the places we care about most.

Analyzing Glacial Isostatic Adjustment Along the Coast of Nain, Newfoundland, in Relation to Sea Level Rise
Presenter: Claire Gadzala
Faculty supporter: Dr. Neal Scott, Department of Geography & Planning, Queen's University

Glacial isostatic adjustment (GIA) is the response of the Earth's crust, the Earth's gravitational field, and the world's oceans to the thickening and thinning of global ice sheets (Whitehouse, P., 2018). GIA has been an ongoing geomorphological process across North America, influencing the Atlantic coast of Canada in relation to sea level rise (SLR). The primary driver of SLR is the melting of land-based ice sheets and mountain glaciers, contributing approximately 2 mm per year to global sea level rise (Lindsay, R., 2023). This study aims to determine whether the rate of glacial isostatic adjustment along the coast of Nain, Newfoundland will outpace the projected sea level rise by 2150. Through analyzing future SLR projections and GIA rates, the extent to which vertical land motion counters sea level rise will be analyzed. Sea level measurements were obtained using satellite altimetry data from the TOPEX, Jason-1, Jason-2, Jason-3, and Sentinel-6 satellites. These measurements do not account for the vertical movement of the Earth. Using projections from satellite-based SLR data, four simulation models were developed for the years 2000, 2050, 2100, and 2150. These models were run using Google Earth Engine through integrating rates of GIA for the city of Nain, approximately 4 mm per year, and projected SLR data from the satellite altimetry data. Comparisons will be made to the city of Umiujaq, Quebec, along Hudson's Bay, which is expected to have similar increases in SLR, however, is experiencing GIA rates of approximately 9 mm per year. I will compare the predicted rates of SLR in relation to GIA to determine the extent of flooding along the coast of Nain for the years 2100 and 2150. Preliminary results suggest that if the rate of GIA is outpaced by SLR projections, coastal flooding risks will increase, necessitating adaptive strategies for vulnerable regions.

Climate change and the decline of Canadas's maple syrup production
Presenter: Gavin Cordon
Faculty supporter: Dr. Neal Scott, Department of Geography & Planning, Queen's University

The Canadian maple syrup industry accounts for over 600 million dollars of Canada's economy each year and provides jobs to thousands of Canadians (Agriculture and Agri-Food Canada, 2025). This product synonymous to the Canadian identity is under threat as recent years have seen some of the lowest maple syrup production in history (Agriculture and Agri-Food Canada, 2025). This drop off is scientifically believed to be as result of climate change and other anthropocentric impacts on the environment which have led to a decline in the health of sugar maple trees (acer saccharum) (Boakye et al., 2023). These trees have seen a reduction in their overall health and growth rate as well as changes to their environments which are becoming more extreme (Boakye et al., 2023). This paper uses dendrochronology and sap collection reports to see if there has been an observable change in tree growth rate, health, and sap production in tandem with climate monitoring data to study changes in the environment. Studying these variables not only grants a view into the changes in health and success of the trees with climate change, but also see if there has been an overall shift in what could be described as the "optimal" geographic area for these trees to grow and the possible economic impacts of that change (Rapp et al., 2019).

Coastal Wetland Response to Climate Change and Sea Level Rise
Presenter: Sebastian Rodriguez
Faculty Supporter: Dr. Neal Scott, Department of Geography & Planning, Queen's University

Wetlands play a crucial role in climate change mitigation due to their abilities to sequester large amounts of organic carbon. Wetlands in Canada compose roughly 1.29 million square kilometers or 13% of the country's total land mass. Canada's wetlands are not immune to the effects of climate change, and increasing sea level rise has continued to bring strain to delicate coastal wetlands in particular. Studies into the long-term changes in these wetlands are variable, as best case scenario results estimate the sequestration of up to 1.5 Pg of organic carbon by 2100 through landward migration, though worst case scenario findings indicate that coastal squeeze could result in the loss of 3.4 Pg of sequestered carbon by 2100. This project aims to understand if the use of satellite imagery and remote sensing techniques can accurately assess and classify regions deemed as coastal wetlands. Multiple supervised classification methods were conducted on a 2024 Landsat 8 false colour composite image of a large coastal marsh in southern Nova Scotia and compared to the most up to date map from the Canadian Wetland Inventory. The most accurate method was returned, and was performed on the same area for an image in 2014 and 2005 respectively. The three classified images were then compared and overlaid onto one another to assess how the region has changed in the 20 year period. It is expected that some areas of the wetland will migrate inwards towards surrounding forested areas, as well as take over small forested islands within the marsh. Additional research into these regions conducted at areas of differing rates of sea level rise, as well as at wetlands bordering different land use types may help bring more understanding to how these ecosystems change over time according to their unique environments.

Factors Controlling Photomineralization of Organic Carbon in Canadian High Arctic Soils
Presenter: Tanya Koletic
Faculty supporter: Dr. Neal Scott, Department of Geography & Planning, Queen's University

Arctic ecosystems are important to consider in the discussion of climate change. The region stores vast amounts of carbon, a large portion of which is situated near the surface. Permafrost thawing due to climate warming can increase the amount of available soil carbon for mineralization to CO_2, potentially accelerating climate warming. This mineralization may be carried out by soil microbes through microbial respiration, or through photooxidation of organic carbon.

Field measurements recorded in 2024 at the Cape Bounty Arctic Watershed Observatory in Nunavut displayed higher rates of CO_2 production in light conditions compared to dark conditions (respiration only), suggesting another process contributing to soil CO_2 production. Options include 1) increased temperature during field measurements stimulates microbial activity, and 2) photomineralization of organic matter due to UV light exposure. To explore the relative importance of these processes, I used both field and laboratory methods. In the field, CO_2 fluxes were measured using closed chambers and an infrared gas analyzer to measure CO_2 fluxes. Soil samples were collected from select field sites that

demonstrated this enhanced CO_2 production. To explore these relationships in a more controlled environment, soil samples were incubated in the lab and subjected to one of four treatments: 1) The control group, where the sample was incubated at 4°C 2) Exposure to artificial light (visible light) with an intensity of 300 micromoles 3) Warming to 20 degrees and 4) Exposure to Ultraviolet light with UVA and UVB wavelengths using a heating lamp. For each of these experiments, I recorded CO_2 production with a PPSystems infrared gas analyzer. The recorded flux measurements will be analyzed to determine how these treatments impact soil CO_2 production. The results of this research will inform how photomineralization of bioavailable soil carbon could impact future rates of warming in the Arctic and globally.

Poster Session II (Geography)

Thursday, March 6, 11:45 AM – 1:00 PM

The 1966 Reading Room, Douglas Library

How Wildfire Intensity Impacts the Extent and Speed of Vegetation Succession: Old Fire versus Cedar Fire – California, USA 2003
Presenter: Adam Baldin
Faculty Supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

Wildfires are one of the most devastating natural disasters, with the ability and potential to destroy infrastructure and ecosystems. On October 25, 2003, two wildfires broke out in California, USA: Old Fire in San Bernardino County and Cedar Fire in San Diego County. These wildfires significantly damaged vegetation and are particularly interesting as they both started on the same day, burned for over a week, and were only approximately 150 kilometres apart, allowing for great comparisons to be made. This project determines which fire was more intense and how their intensities impacted the extent and speed of vegetation succession. Wildfire intensity refers to the amount of energy released by the fire. It incorporates components like ground temperature, flame height, and spread rate, and is influenced by factors such as weather conditions, plant chemistry, and topography. This project, however, observes weather conditions and topography specifically to reveal how these wildfires of different intensities impacted vegetation succession. LANDSAT satellite imagery in the shortwave infrared (SWIR) and thermal layers were analyzed using ENVI to observe fire size. Climate data provided the weather conditions before and during the fires. Government reports and news articles gave information on flame heights and spread rates. These contributed to determining fire intensity. Then, LANDSAT imagery in the Normalized Difference Vegetation Index (NDVI) layer was analyzed using ENVI over approximately twenty years (2003-2023) to observe the growing vegetation. While both fires were active for a similar duration, Cedar Fire was more intense, resulting in slower vegetation succession due to hotter ground temperatures, taller flame height, and a faster spread rate compared to Old Fire. The impact that both wildfires had on vegetation highlights the importance of mitigating future wildfire risk, especially as natural disasters like wildfires become more frequent and more intense with continuing global warming and climate change.

Floodplain Hazard Analysis Around the Rideau River
Presenter: Charlie Bodger
Faculty supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

Within the context of intensified natural hazard events due to climate change, the consideration of human lives and well-being is necessary. One such case of the effect nature has on humanity is through flooding events. For the Ottawa region, this has become an increasingly prominent issue. This study

approaches the numbers behind flood risks in Ottawa, particularly surrounding the Rideau River watershed. This watershed was chosen due to the lack of research surrounding the scale of a flood event in this region. The Rideau Valley often consists of rural townships, which are less often outfitted with necessary response measures to natural hazards. This study seeks to use floodplain data as provided by the Rideau Valley Conservation Authority (RVCA) and Ottawa Municipal Open Data sources to map the flood risk areas along the Rideau River and assess the scale of the affected population. This analysis uses ESRI's ArcGIS program to both create and analyse the overlap between floodplain and housing data. The study also addresses changes in flood risk severity using flood depth data provided by the RVCA, comparing the extent of 100yr and 350yr flooding. Additional open-source data from the Ottawa Neighborhood Study (ONS) allows for analysis of the adjacency to first responders, along with classification of addresses to their closest stations. Dissemination Area (DA) analysis suggests that at least fifty-nine DA districts in Ottawa are within the floodplain of the Rideau River. These districts contain census data including total population (as of 2016), number of dwellings, and population density. The combination of statistical and geographical analysis of these regions will give effective insight to the number of dwellings and estimated population affected in a flood event.

Carbon Cycling in Canada's Boreal Forest: Investigating the Role of Vegetation Composition on Net Ecosystem Exchange

Presenter: Katherine Bot

Faculty Supporter: Dr. Neal Scott, Department of Geography & Planning, Queen's University

Canada's boreal forest plays an important role in the global carbon (C) cycle, but its C dynamics are being altered by climate change. Shifts in temperature, precipitation, and growing season patterns influence how these ecosystems store and release C. Understanding how different regions of Canada's boreal forest regulate C and respond to climate variability is essential for predicting the impacts of climate change on these ecosystems. My study examines how vegetation composition influences C cycling by comparing the net ecosystem exchange (NEE) at a Boreal Mixedwood Forest in Ontario, and an Eastern Boreal, Mature Black Spruce Forest in Quebec. Using six years (2004-2009) of eddy covariance (EC) measurements, I analyze seasonal and interannual variability in C fluxes and identify environmental drivers influencing these variations. Preliminary results show that the Mixedwood forest consistently functions as a net C sink (-97.97 ± 35.98 g C m^{-2} y^{-1}), while the Black Spruce site fluctuates between a small C sink and source (-0.2268 ± 15.18 g C m^{-2} y^{-1}). Seasonal trends reveal that both sites act as C sources in winter when ecosystem respiration (ER) exceeds gross ecosystem production (GEP), and as C sinks in summer, when GEP surpasses ER. However, C uptake is substantially higher at the Mixedwood site, driven by greater GEP and ER throughout the year. My research provides insights into how forest composition regulates boreal C dynamics and enhances our understanding of how these forests may respond to future climate change, informing sustainable forest management strategies.

Assessing the Influence of Climate and Land-Use Change on Jefferson Salamanders in Ontario's Greenbelt

Presenter: Payge Callaghan

Faculty Supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

The Golden Horseshoe of Ontario is one of the fastest growing regions in North America, with a projected population of over 13.5 million people by 2041. Over 2 million acres of land within this area is protected by the Greenbelt, a framework created to promote conservation and prevent urban sprawl within ecologically significant and sensitive lands. However, habitat fragmentation due to human development, coupled with shifting climate patterns poses a significant threat to species at risk, including the Jefferson Salamander (*Ambystoma jeffersonianum*). This species is particularly vulnerable to habitat fragmentation, which reduces access to vernal ponds that are essential for breeding. This study aims to address how climate and land-use changes have impacted the range of Jefferson Salamanders in the Ontario Greenbelt. To assess changes between historical and current salamander distributions, provincially tracked occurrence data is mapped alongside Greenbelt boundaries and designations. Land-use changes between 2000 and 2015 in the area are quantified using the Southern Ontario Land Resource Information System (SOLRIS) Versions 1.1 and 3. Additionally, historical climate data from Environment and Climate Change Canada is analyzed to evaluate shifts in temperature and precipitation trends. Early results indicate a high concentration of the Jefferson Salamander throughout the Niagara Escarpment, with populations bordering or within high-density areas of the Greater Toronto Area (GTA). Climate normals from the 10 weather stations within the Greenbelt boundary illustrate an overall increase in temperature and precipitation trends from the period 1961-1990 to 1981-2010. These findings suggest that habitat fragmentation and shifts in local climate may be contributing to a reduction in range and suitable habitats of the Jefferson Salamander.

Investigating Climate Change and Its Impact on Tree Senescence at Queen's Biological Station

Presenter: Mia Angelina Carbone

Faculty supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

Vegetation phenology tracks the seasonal progression of plant activity, acting as a key regulator of ecological dynamics and biosphere-climate interactions. The rate of phenology is primarily sensitive to temperature and precipitation, and changes in these environmental factors significantly influence the timing of life cycle events in plants. Climate change-driven shifts in environmental factors disrupt cues that regulate leaf senescence in trees, potentially influencing tree health and mortality. Given the strong correlation between climatic factors and plant phenology, monitoring senescence is crucial to understanding changes in tree life cycles in response to climate change. Monitoring phenology has been commonly applied using remote sensing techniques to examine the progression of vegetation phenology and is significantly advancing tree senescence research. This project examines the timing and rate of tree senescence and its response to climate change at the Queen's University Biological

Station (QUBS). Images of trees at QUBS are collected on the Phenocam Network, situated above a forest canopy, capturing images every 30 minutes since 2008. From each acquired time series image, red, green, and blue (RGB) colour channel information was extracted, specifically Red Chromatic Coordinate (RCC) and Green Chromatic Coordinate (GCC) values, to quantify the redness and greenness of pixels in an image. By coupling these colour-based metrics with climate data, this study aims to quantify the effects of climate change on the rate of leaf senescence and its implications for tree mortality. The results from this research may reveal that over a 16-year period, climate change, driven by warmer temperatures and altered precipitation patterns, is accelerating leaf senescence in tree species. Findings explain strong correlations between climate variables and the timing of senescence within tree species. While trees may accelerate senescence as a defense against stressors, early senescence can harm tree health, ecosystem dynamics, and environmental processes, particularly with climate change.

Assessing the Impact of Land Use on Eutrophication in the Dorset Lakes in the Muskoka River Watershed

Presenter: Madeleine Coulson
Faculty supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

Across Ontario, climate change and human activities such as land-use and land-cover (LULC) change for industrial, urban and agricultural development are exacerbating threats to water quality including eutrophication. Eutrophication, driven by loading of limiting nutrients, mainly phosphorus (P) and nitrogen (N), can be detrimental to aquatic ecosystems by fueling the growth of harmful algal blooms, some of which are toxic. Lakes in the Muskoka River Watershed (MRW) are increasingly affected by algal blooms, endangering public health and lake ecosystems. Since the mid-1970s, the Dorset Lakes Monitoring Program (DLMP) has intensively studied water quality in eight MRW lakes to track the effects of anthropogenic disturbances and climate change.

This study examines whether LULC is influencing nutrient levels and eutrophication in six of the Dorset Lakes in the MRW. Specifically, it assesses trends in P and N concentrations over the past 50 years and examines the spatial correlation between nutrient levels and surrounding land cover types, including agricultural, anthropogenic, wetlands, forest and water body land-use areas.

Using ArcGIS Pro and up to date Muskoka GeoHub LULC data, this research quantifies LULC composition within multiple buffer zones (100m, 500m, 1km, 2km, and 5km) around each lake. Water quality data from the DLMP provided by the Ontario Open Data Catalogue, is analyzed to track changes in nutrient concentrations over time, to identify the most impacted lakes. Pearson's Correlation was used to assess the relationship between the percent area of each land cover types and the recent concentrations of P and N.

Preliminary results show that anthropogenic land-use does not seem to have a direct impact on the water P and N concentrations, suggesting that these lakes remain minimally disturbed by land-

use/cover change, and remain suitable areas for tracking long-term trends in water quality and the impacts of climate change.

A Comparison of Concentration Trends of Road Salt in Streams of Urbanized and Rural areas in Kingston

Presenter: Angela Fang

Faculty Supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

The extensive use of road salt in Ontario is necessary to maintain safe transportation networks during the province's long, cold winters. Frequent freeze-thaw cycles lead to repeated salt application, particularly in urban areas with high traffic volume and dense road networks. This study examines the spatial and temporal trends of chloride concentrations in streams across urban and rural areas in Kingston, Ontario, and assesses how land use and road density influence these levels. By selecting two areas with different degrees of urbanization, this research will compare chloride concentration trends between urban environments, where heavy road salt use is expected to have a pronounced impact, and rural areas, where natural landscapes and agricultural land may moderate chloride accumulation. To achieve this, road and river segment layers will be integrated into a GIS platform for spatial analysis. Additionally, water quality data—including chloride concentrations, pH levels, conductivity, and potentially more variables—will be sourced from the Provincial (Stream) Water Quality Monitoring Network and compared to for the year 2022. Correlation and regression analyses will also be conducted to quantify the relationship between road salt application and key water quality variables. It is expected that higher road density will correspond to elevated chloride levels, with stronger correlations observed in urban areas. The findings of this study will provide insights into the environmental consequences of road salt use and inform strategies for sustainable winter road maintenance that balance transportation safety with ecosystem health.

Forest Structure in Belle Park and Island, Kingston, Ontario, Canada

Presenter: Katarina Kaludjercic

Faculty supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

Forest structure refers to the physical arrangement of all the components of a forest (USDA, 2025). The structure of a forest can be impacted by natural and anthropogenic processes, and thus studying the forest structure of an area can help us better understand the impacts of these processes (USDA, 2025). Belle Park, and it's adjacent Belle Island, are situated in Kingston, Ontario. Belle Park was built on a wetland, and in 1952 the wetland was converted to a municipal landfill that was in use until 1974. By 1978, the area was converted to a golf course and the land was filled in, and finally in 2017 was turned into the park (BPP, 2024). This study aims to better understand the impacts of these land uses by looking at the forest structure and species in various areas of the park and island that were impacted by different land uses.

A point-centered quarter method (PCQM) was used to estimate the number of individuals present in each chosen area (ClintonCC, 2025). Two areas were chosen in the park, and one on the island, and data was collected at 10 equally spaced points along a transect. Based on species, diameter at breast height, and distance from center point, stem density and basal area were calculated using appropriate equations.

It is expected to find that there will be differences in the species and the forest structure of each chosen area on Belle Park/Island due to the differences in land uses and human interventions. By understanding the differences in species and forest structure of these different areas, we can aim to better understand the "natural" state of this land in comparison to the disturbed areas, and overall gain a better understand of how this land was impacted by its land uses.

Quantifying the Impact of Wildfire on MeHg Production
Presenter: Lydia Morrow
Faculty Supporter: Dr. Neal Scott, Dept. of Geography and Planning, Queen's University

Subarctic regions are undergoing rapid climate change, leading to increased permafrost thaw and more frequent wildfires. These environmental changes significantly impact water quality, which is critical for ecosystems, community health, and food security. Permafrost stores organic material, nutrients, and contaminants such as mercury. When thawed, these substances are released into surrounding water systems, enhancing hydrological connectivity and facilitating contaminant transport. Wildfires further alter hydrological pathways by burning vegetation and organic matter, increasing the release of nutrients and contaminants. Burnt landscapes can accelerate the production of methylmercury (MeHg), a highly toxic and bioaccumulative form of mercury that poses risks to aquatic and terrestrial food webs. This project examines how wildfire affects the production of methylmercury in boreal peatlands by comparing pre and post wildfire water quality data from Scotty Creek Research Center, Northwest Territories Canada. In 2022, the research station and surrounding area were affected by a devastating wildfire. Water quality data at sited examined by Gordon et al. in 2013 were revisited in 2024, allowing for direct comparisons of pH, temperature, dissolved organic carbon (DOC), total mercury, and MeHg concentrations. This study specifically investigates how MeHg concentrations have changed over time and how they correlate with other environmental variables. Additionally, it explores which landcover types exhibit the highest MeHg concentrations and the most significant post-fire changes. Preliminary results indicate a general increase in MeHg concentrations across all landcover types from 2013 to 2024. These findings provide critical insights into how wildfire-driven permafrost thaw influences contaminant dynamics in boreal peatlands. The results of this study will help inform water quality policies and mitigation strategies for managing post-wildfire water quality in northern regions.

Estimating Snowmelt-Driven Watershed Discharge in the High Arctic Using Remote Sensing and GIS
Presenter: Anna O'Flynn
Faculty Supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

Climate warming is rapidly altering Arctic tundra ecosystems, influencing seasonal processes like snowmelt and soil thaw, with significant implications for hydrological dynamics. Snowmelt is a critical hydrological event in the Canadian High Arctic, as it drives biogeochemical cycling, controls microclimate conditions, affects freshwater availability, and influences the distribution and phenology of Arctic flora and fauna. However, snowmelt dynamics remain under-researched and poorly understood in many regions of the High Arctic, where the extreme remoteness, inclement weather, limited infrastructure, and long polar nights limit the feasibility of in-situ hydrological research. This project proposes a method to address this knowledge gap using only remote sensing data and GIS techniques to estimate the onset and duration of snowmelt and associated discharge dynamics in High Arctic watersheds. The method involves using high-resolution Digital Elevation Models (DEMs), Landsat 8/9 satellite imagery, and global weather and climate data from Natural Resources Canada, the USGS, and NASA's Goddard Earth Sciences Data and Information Services Center (GES DISC). These datasets will be processed in Google Earth Engine, ArcGIS Pro, and RStudio to estimate snow accumulation, snowmelt timing, and runoff volumes throughout the 2019–2023 snowmelt seasons. Model estimates will be evaluated against in-situ discharge data from the Cape Bounty Arctic Watershed Observatory on Melville Island, NU, to assess their accuracy. By developing a remote sensing-based method for estimating discharge, this research seeks to improve hydrological monitoring in data-scarce Arctic environments. If successful, the approach could enhance understanding of snowmelt-driven hydrology and support future climate impact assessments in the Canadian High Arctic.

Site Suitability Assessment for a New Nuclear Waste Disposal Site in Ontario
Presenter: Tate Powell
Faculty Supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

To meet the growing demand for electricity in Ontario, the federal and the provincial governments are expanding nuclear power generation in Ontario. Part of these expansion plans include developing North America's first small modular reactor (SMR) at the Darlington New Nuclear Project site (Small modular reactors: Darlington SMR 2024). While cheaper and easier to build than traditional reactors, researchers at Stanford University and the University of British Columbia have found that SMRs produce more nuclear waste per unit of energy compared to traditional reactors as a result of increased neutron leakage (Liou, 2023 ; Krall et al., 2022). Nuclear power is a large step towards achieving net-zero but this expansion makes finding more storage for the nuclear waste produced increasingly necessary (2030 Emissions Reduction Plan – Sector-by-sector overview 2024). This project assesses appropriate sites in Ontario to establish a new nuclear waste disposal site. A GIS analysis will be predominantly relied upon

to create a model to evaluate various layers and site characteristics. Factors currently being assessed in the model are groundwater, potential disturbances to the land (ie. current or future mining activity), and whether the lands are federally or provincially protected lands. The Province is split into 71 districts, in accordance with the Ecosystems of Ontario Ecodistricts. These districts are then either included or excluded in the model based on the development of their aquifers and whether the land contains any natural resources that are currently, or could be, mined. The remaining Ecodistricts are then overlain with protected lands and the remaining sites are usable. Preliminary results have shown sites available are predominantly in northern Ontario. Future factors that will be incorporated into the model include a soil and geology suitability assessment and an accessibility assessment, using existing road access to the site as the criteria for this factor.

Drivers of Circulation Patterns in Colour Lake, Nunavut
Presenter: Declan Roche
Faculty supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

The thermal cycling of lakes is crucial to all aquatic life, greatly influencing primary productivity through the distribution of heat, nutrients, dissolved oxygen and suspended sediments (Liu et al., 2024). The high Arctic region of Canada contains large amounts of lakes covered in ice for up to ten months a year. Logistical and technical difficulties have made year-round monitoring of these lakes difficult, creating a gap in the literature. Quantifying circulation patterns can be done by monitoring conductivity and temperature as they demonstrate how the water is being moved around and stratified. Based on the premise of identifying conductivity and temperature variances in lakes, this study will look to answer how wind, air temperature, solar radiation, and snow depth influence circulation patterns in a representative high Arctic Lake, Colour Lake on Axel Heiberg Island, and what the dominant factors affecting circulation patterns are. The environmental and lake data were collected at fifteen-minute intervals over two years. Wavelet analysis will be used to compare periodicity and phases of the time series data from the lake and environmental variables. Finally, lake surface imagery will then be compared with the results of the wavelet analysis to determine what is going on when the lake is affected by environmental variables and what is going on when it isn't. Understanding the drivers of lake circulation patterns is critical in our knowledge of northern systems and how climate change may affect them down the road.

The Role of Extreme Precipitation in Triggering Mass Wasting Events in the St. Lawrence Lowlands: A Retrospective Analysis

Presenter: Thomas Stevenson

Faculty Supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

In Canada, landslide and mass wasting events are most associated with the mountainous regions of British Columbia and Alberta, where they have resulted in 356 fatalities (Government of Canada, 2024). Therefore, a great deal of landslide research focuses on Western Canada. However, despite experiencing significant mass wasting events resulting in 239 fatalities, Quebec appears to receive less attention in such research (Government of Canada, 2024). Within the St. Lawrence Lowlands, a region extending from Quebec City to the Ottawa Valley, numerous mass wasting events have destroyed communities, highlighting the need for more attention. Mass wasting events are complex and can be triggered by several factors, including extreme weather. With the possibility of climate change increasing the intensity and frequency of extreme weather events, understanding weather's role in triggering mass wasting events in the St. Lawrence Lowlands is critical. This study examines the extent to which extreme weather, particularly heavy precipitation, has influenced past mass wasting events in the St. Lawrence Lowlands. A retrospective analysis is used by correlating past landslide and mass wasting events with historical weather data. By using public historical weather station data published by the Government of Canada, precipitation data is compared to the timing of mass wasting events. Additionally, the region's soil compositions, particularly Leda clay, are analyzed to assess its susceptibility to rain-induced failure. It is expected that examining this relationship will explain the prevalence of mass wasting events in the region and the implications highlight potential future risks to communities amid a changing climate.

Maximum Entropy Modeling Loggerhead Shrike Distribution in Southern Ontario

Presenter: Griffin Wade-Salay

Faculty supporter: Dr. Neal Scott, Department of Geography and Planning, Queen's University

The Loggerhead Shrike is a critically endangered species in Ontario and with climate change increasingly threatening avian habitats, it is expected to become even more endangered in the years to come. Additionally, the habitat of the Loggerhead Shrike is not comprehensively understood which makes it an interesting subject of study. Across Ontario, the Loggerhead Shrike is found notably in two distinct pockets: one is around Napanee, and the other is just Northeast of Lake Simcoe, an area at risk of development. This study focuses on the second area and aims to leverage distribution modeling technology in the hopes of a) identifying suitable areas for the Loggerhead Shrike and b) creating a clearer picture of the bird's ideal habitat. Given a lack of species absence data, a Presence-Only Prediction (MaxEnt) model is used within ArcGIS Pro to create a prediction surface based on input presence points from iNaturalist. Extensive research was done to choose a set of environmental variables (e.g., land cover, elevation, NDVI, etc.) to be tested for significance in the model. The preliminary outputs of the model are then tested for accuracy through both an automated (resampling)

and custom validation method. The latter is done by plotting the observed points against their model-predicted presence values and comparing that to an ideal scenario, in which the model's success at identifying suitable habitats is quantitatively estimated and subsequently re-tested with different parameters and variables. Preliminary results show that low elevations, grasslands, and significant distance from roads are key habitat-determining elements. There is potential for this approach to be used in conservation efforts for nesting birds more generally.

Session D: Experiential Learning in the Health Sciences

Friday, March 7, 9:05-10:20 AM

The 1966 Reading Room, Douglas Library

Moderator: Courtney Svab, Health Sciences Librarian

Preparing for Cross-Cultural Experiential Learning Through Simulation Exercises
Presenter: Shadi Mousavi Nia
Faculty Supporter: Dr. Jennifer Carpenter, Biomedical & Molecular Science, Public Health Sciences, Emergency Medicine

Introduction: Cultural humility and management of ethical and safety dilemmas are critical competencies for learners preparing to integrate into new communities through experiential learning. Didactic teaching imparts theoretical knowledge but fails to replicate the real-time discomfort of practical scenarios. The Ethical and Cultural Simulation exercise was designed to address this gap by having participants master one case scenario, then serve as facilitators for peers who role-play the learner. Cases addressed requests to work beyond one's scope of practice, harassment by street vendors, sexual advances, and situations that conflict with personal ethics.

Methods: A survey was administered immediately following the simulation. Four scenarios comprised the exercise: (A) Requests for financial aid, (B) Learning from Community Members in Culturally Appropriate Ways, (C) Flycatchers, Personal Safety, and Sexual Advances, and (D) Scope of Practice and Avoiding Negative Impact on the Community. For each scenario, participants rated perceived utility, identified elements of usefulness and limitation, and reported potential applicability in Tanzania. A follow-up survey will be administered immediately after the experiential placement, prompting students to reflect on situations where they recalled their simulation learning. They will indicate whether that knowledge did/did not assist them in managing the immediate cultural/ethical situation.

Results: For Case A, 33% of participants considered the exercise slightly or moderately useful, whereas 66% deemed it very or extremely useful. Cases B, C, and D each had 43% of participants reporting the exercise as slightly or moderately useful, with the remainder describing it as very or extremely useful. Post-trip data will elucidate whether these early perceptions translate into practical value during the subsequent experiential learning component. Preliminary observations suggest that role-play simulation prior to experiential placements may strengthen students' cultural and ethical sensitivity in real-world settings. Continued investigation could further illuminate best practices for integrating simulation-based exercises into cross-cultural experiential learning curricula.

Exploring the Role of Experiential Learning in Tanzania on the Understanding of One Health
Presenters: Shayne Belchos, Nikita Chopra, Heeya Patel, Emily Moar, Quintyn Zuber
Faculty Supporter: Dr. Jennifer Carpenter, Faculty of Health Sciences, Queen's University

The One Health framework recognizes the unifying interconnectedness of human, animal, and environmental health, emphasizing the need for interdisciplinary collaboration to address global health challenges. Within this framework, cultural determinants of health including education, beliefs, values, and traditional practices play a critical role in shaping cultural norms, healthcare delivery, and policies. Understanding these determinants is essential for designing effective public health strategies that respect cultural contexts.

This study introduces the first iteration of the experiential learning course HSCI 595, designed to build cultural competency and humility to foster health equity learning through direct community engagement. Featuring pre-departure training, reflective assessments, and a 20-day educational trip to Tanzania, this course integrates service-learning experiences at Pamoja Tunaweza Women's Centre in Tanzania. The course equips students with the skills needed to leverage One Health principles into applications of holistic healthcare.

The three primary objectives are to explore how an experiential learning opportunity influences One Health conceptual understanding; how social and health-based activities impact learning and the perceived application of One Health in human health careers; and how experiential learning activities shape understanding of the role of non-human and ecological spheres. A pre/post-survey with quantitative and qualitative metrics will be used to assess changes in students' understanding of One Health. The study will compare results between students enrolled in HSCI 595 and a cohort of students participating in a theoretical setting to learn about the OneHealth framework.

By integrating experiential learning, this study provides insights into the effectiveness of immersive educational approaches in global health. The findings will contribute to improving curriculum design and preparing future professionals to address complex health challenges through a One Health perspective.

Perceived Community Impact of International Experiential Learning
Presenters: Julia Apolot, Malek Benameur, Kate Cruess, Briar McCaw, Emily Moar, Olivia Skinkle
Faculty Supporter: Dr. Jennifer Carpenter, Biomedical & Molecular Science, Public Health Sciences, Emergency Medicine, Queen's University

Introduction: Kolb's experiential learning model suggests that learning is enhanced through concrete experience, reflection, abstract conceptualization, and active experimentation (Slavich & Zimbardo, 2012, p. 573). Although the benefits of Kolb's experiential learning theory on the learner have been well

documented, there is a gap in the literature on the impact of these opportunities on the local community and organizations. This study, realizing the benefits of Kolb's theory, investigates the potential intended and unintended impacts on local communities/organizations by looking at how participants in international community-based learning or volunteer trips perceive their impact on local communities. The primary objective is to explore how Queen's University's HSCI 595: Cross-Cultural Determinants of Health course students perceive Tanzanian organizations' and communities' views on international learning trips like HSCI 595. The secondary objective is to compare these insights with perspectives from individuals who have participated in other international volunteering and experiential learning experiences.

Methods: To achieve this, the study uses daily transformative journaling during the HSCI 595 Tanzania trip and survey questions as primary data collection methods. Additionally, it will conduct a literature review to assess the findings of any previous research done on this topic. The qualitative data will be analyzed through thematic analysis, identifying recurring patterns and key themes that emerge from participants' reflections and survey responses.

Implications: By addressing a serious gap in literature, this research aims to gain insight into the perceived impacts of experiential learning and volunteering on local communities/organizations. The findings will contribute to a broader understanding of international community-based learning. By comparing experiential learning trips with more traditional volunteer work, this study provides new insights into how international experiences influence both participants and the communities they seek to support.

Changes in Perspectives and Long-Term Impacts from the HSCI595 - Cross Cultural Determinants of Health Course
Presenters: Sarina Jeffcoat, Swetlana Kumar, Jashmira Bhinder, Tsegaw Geremew Belayneh, Malek Benameur
Faculty Supporter: Dr. Jennifer Carpenter, Biomedical & Molecular Science, Queen's University

Global health collaboration trips have been shown to improve skill development in students. However, global health collaboration trips also expose students to new situations and transformative experiences that may impact their understanding of the world and their position within society globally.

Twenty-two Queen's University students participated in the HSCI595 course in the 2025 winter term which involves an experiential learning trip to Moshi, Tanzania. To examine how participation in the course in Tanzania affected the perspectives and motivation for long-term career goals of the students, this study involved analyzing responses from mixed methods pre- and post-course surveys and pre- and post-trip surveys.

Questions in the surveys involved perspectives surrounding power, privilege, global collaboration skills, cultural competence, and long-term career goals/motivations. Furthermore, daily activity reflections

were analyzed to examine specific experiences that contributed to changes in perspectives surrounding these topics in conjunction with the surveys.

By examining common themes within daily activity reflections that have the potential to cause changes in perspectives and long-term goals/motivations, this study aims to provide evidence-based guidelines to optimize the impact of future experiential learning trips at Queen's University and beyond.

Furthermore, through focus groups conducted in the future with students who participated in service-related trips (ex. Operation Smile) and non-Bachelor of Health Sciences students to help establish a baseline for changes in perspectives and motivations. In the future, follow-up surveys will be conducted 2-years and 5-years after experiential learning trip participation to examine trends in persisting long-term career goals, progress on said goals, and transient effects.

Enhancing Accessibility and Sustainability of HSCI 595, a Tanzanian Experiential Learning Course
Presenters: Jashmira Bhinder, Corrinne White, Shadi Mousavi Nia
Faculty Supporter: Dr. Jennifer Carpenter, Biomedical & Molecular Science, Public Health Sciences, Emergency Medicine, Queen's University

Introduction: Experiential learning is recognized as a crucial component of undergraduate education, yet personal and external constraints can limit inclusive participation. Current literature lacks adequate evidence to guide the optimization of experiential courses for equitable access and financial sustainability. The proposed research investigates strategic enhancements to the HSCI 595 Tanzanian experiential course, with the aim of improving accessibility for diverse student populations while ensuring its long-term financial sustainability. The study focuses on three primary objectives: 1) identifying financial barriers to participation, 2) exploring students' sociocultural and emotional readiness for international engagement, and 3) assessing perceived facilitators that could improve program inclusivity.

Methods: Data were gathered through pre- and post-surveys, capturing both anticipated challenges and actual experiences. The pre-survey elicited participants' initial concerns regarding finances, cultural adaptation, and personal preparedness, while the post-survey examined how these factors evolved over the course of the program. In addition to closed-ended items about funding sources and socioemotional barriers, open-ended questions solicited reflections on resource gaps, unforeseen expenses, and supportive measures. Participants were also encouraged to identify any physical or mental accessibility-related challenges, and to discuss how these needs were addressed, including the resources or modifications employed in the program.

Implications: Although final results are forthcoming, preliminary indications suggest that strategic financial aid, sociocultural orientation, peer support, and institutional facilitators could enhance student participation and accessibility to experiential programs. Through tailoring pre-departure resources to address personal hesitations and logistical complexities, institutions can strengthen student

preparedness, and self-efficacy. Furthermore, the long-term viability of such initiatives may depend on sustainable funding models and ongoing evaluation of participant feedback. The findings from this work will guide actionable recommendations to refine the HSCI 595 Tanzanian experiential course, serving as a potential model for other universities seeking to advance equitable and financially secure international learning opportunities.

Competency Development Through Experiential Learning
Presenter: Corrinne White, Swetlana Kumar, Kaileigh Webber
Faculty Supporter: Dr. Jennifer Carpenter, Faculty of Health Sciences, Queen's University

Introduction: Transformative experiences have shown to be an impactful part of the development and learning of future healthcare professionals in the past. Many of these experiences have historically been obtained through service-related trips, such as Operation Smile, Medical Brigades, etc. While these trips are beneficial, they also present potential harms related to lacking community engagement, application of Western views in cultural contexts, and a lack of follow-up care in the communities after the students return to their country of origin.

Methods: Students participating in the HSCI595 course which involves an experiential learning trip to Moshi, Tanzania completed mixed-methods pre-course survey, pre-trip survey, daily transformative experience journalling, and a post-trip survey. Once the pre- and post-trip data was obtained, the qualitative data was coded to determine major themes among pre-trip responses and post-trip responses separately. This qualitative and quantitative data was combined to summarize results and identify any changes in themes and correlational relationships between impactful transformative experiences and competency development.

Results: By examining the specific transformative experiences that led to competency development in HSCI595, we hope to determine the factors and common themes of global health collaboration trips that led to competency development.

Conclusion: The conclusion derived from this data will aid in the organization and optimization of future global health collaboration trips within the HSCI595 course, as well as providing a framework of beneficial factors for other trips as well.

In the future, to compare the differences and similarities between both service-related and education-oriented trips, such as the one carried out in HSCI595, mixed-methods surveys will be used to examine competency development within focus groups from campus partners who host service-related trips, and the Queen's student body in genera and compared to data from the HSCI 595 group.

Pre-Departure Curriculum and Its Impact on Ethical and Reflexive Experiential Learning and Cultural Humility
Presenter: Shadi Mousavi Nia & Julia Apolot
Faculty Supporter: Dr. Jennifer Carpenter, Biomedical & Molecular Science, Public Health Sciences, Emergency Medicine, Queen's University

Introduction: Cross-cultural experiential learning programs create opportunities for students to engage with diverse communities through ethical and reflexive practices. Inadequate preparation may reduce cultural awareness and perpetuate harmful stereotypes, colonial attitudes, and Eurocentrism. Pre-departure training serves as a critical foundation for equipping students with the necessary skills to critically analyze dominant knowledge systems, navigate ethical dilemmas, and approach cultural differences with humility. However, there is a need to assess whether the current pre-departure training effectively fosters cultural humility and ethical engagement, as well as to identify areas for refinement that can enhance the curriculum's relevance and impact over time. The present investigation examines whether pre-departure training supports students in developing cultural humility, engaging ethically with local communities, and enhancing self-awareness throughout the learning experience.

Methods: A mixed-methods design was employed, incorporating pre- and post-trip surveys to capture quantitative shifts in students' self-assessed readiness and qualitative reflections on their evolving perspectives. The pre-departure curriculum included interactive sessions on Eurocentric narratives, ethical engagement, and critical self-reflection. Participants ranked curriculum components, provided open-ended feedback on areas for improvement, and discussed their sense of positionality and privilege. Post-trip surveys examined changes in cultural humility and ethical reflexivity, reflecting the degree to which on-site immersion complemented the preparatory training. Quantitative data were analyzed through paired t-tests, and qualitative responses were examined using thematic analysis.

Implications: This research can support the ongoing refinement of HSCI 595's curriculum by integrating student feedback to enhance its relevance and effectiveness. An effective pre-departure curriculum that prioritizes anti-colonial perspectives, cultural humility, and ethical learning can enable students to critically analyze Eurocentric assumptions. Encouraging students to critically reflect on their personal biases, positionality, and potential ethical dilemmas strengthens their global health engagement, cultural humility, and awareness of power imbalances and diverse knowledge systems.

Session E: Health Sciences I

Friday, March 7, 10:30-11:30 AM

The 1966 Reading Room, Douglas Library

Moderator: Amy Rutherford, Health Sciences Librarian

Developing a Pipeline to Convert Marker Less Motion Capture Data from Theia3D into Open Sim for Advanced Biomechanical Analysis
Presenter: Komal Azeem
Faculty Supporter: Dr. Pouya Amiri, School of Kinesiology and Health Studies, Queen's University

Marker less motion capture technologies, such as Theia3D, have become popular for biomechanical analysis by eliminating the need for physical markers, therefore improving the ease of data collection and post-processing. A major limitation to this technology is the lack of tools that integrate marker less motion capture output into more advanced biomechanical analysis software, such as Open Sim. The absence of a workflow between these software prevents researchers from performing advanced biomechanical analyses using Open Sim's modelling capabilities Thus, the main objective of this research was to develop a pipeline to convert the output from Theia3D into a compatible format for analysis in Open Sim.

A subroutine was developed in Python to convert the Theia3D outputs into a format suitable for Open Sim. The test data included marker less motion data from treadmill running collected in Theia3D by 8 Sony cameras. The output of this data was in an .mot file that was processed to develop a file compatible in Open Sim. This process involved 4 key steps: (a) extracting kinematic data from Theia3D, (b) restructuring matrices to match Open Sim's input requirements, (c) generating plots to visualize the motion, and (d) producing a compatible file that allowed for model scaling in Open Sim. The tool was tested by processing the Theia3D dataset, and successfully converted the marker less motion capture data into an Open Sim-compatible format that allowed for analysis.

This tool provides an advantage to biomechanical researchers by integrating marker less motion capture data into Open Sim, expanding its applications of motion analysis. Currently, this tool has only been tested on a limited dataset, and future work will focus on optimizing the conversion algorithm and expanding compatibility with different movement patterns to enhance the usability and reliability of marker less motion capture data in Open Sim.

Barriers and Facilitators to Adopting a Syphilis "Rapid Test and Immediate Treatment" Outreach Model of Care in a Southern Ontario Public Health Unit
Presenter: Sina Sayyad
Faculty Supporter: Dr. Sahar Saeed, Public Health Sciences, Queen's University

Introduction: In recent years, Ontario has experienced a surge in infectious syphilis. In response, eight Ontario public health units (PHUs) implemented a syphilis "test and treat" outreach model of care. In line with the PRISM implementation science framework, this study aimed to identify contextual barriers and facilitators to model adoption.

Methods: An instrumental case study using Yin's constructivist paradigm was selected to identify decision-making processes at one of the PHUs. A literature review and expert testimony informed a semi-structured interview guide. Front-line and decision-making PHU staff, recruited through purposive sampling, underwent transcribed semi-structured interviews. The verified, de-identified transcripts were abductively coded by two independent researchers and analyzed to generate results.

Results: Three front-line and three decision-making staff were interviewed. Five key facilitators to model adoption emerged. (1) Innovation drivers and (2) a flatter organizational structure, with multiple participants highlighting that these two create an "overall organizational culture" more innovative and action-oriented. These factors enabled frontline staff to bring solutions to decision-makers keen on adopting new initiatives and "physician leadership being OK with the medical, legal risk of these initiatives." (3) Existing infrastructure such as task-shifting and leveraging "outreach models… for COVID-19 made the team more familiar…and comfortable with the outreach model." (4) Existing relationships with community-based organizations (CBOs) catalyzed adoption. (5) The perceived urgency/relevance, due to high incidence rates, further propelled adoption. All participants discussed high loss to follow-up in the PHU, with one noting its potential reduction the model's "biggest benefit." No significant barriers to adoption emerged, with immediate treatment benefits for a transient population outweighing challenges. Insights from regional CBOs, through staff focus groups, will be incorporated by March 2025.

Conclusions/Implications: Five key facilitators emerged for adopting a new model of care at an Ontario PHU. These findings can guide other PHUs adopting this model of care to address the syphilis epidemic.

How will Kingston Care? Designing for Better Health Outcomes
Presenter: Molly McClement
Faculty Supporter: Dr. Katherine Romba, Global Development Studies, Queen's University

Seniors have outnumbered children in Kingston, Ontario, since 2008. The Community Foundation for Kingston & Area 2017 Vital Signs report projected that the 65+ age cohort would rise to 27% of Kingston's population by 2026. (CFKA, 2017) Among the many implications that Kingston's aging population brings is an increased need for health care services. (Statistics Canada, 2024) The demand comes amidst a nation-wide staffing crisis in the healthcare sector that has already impacted the ability

of Kingston to meet the needs of its population. Both public and private long-term care facilities have lengthy waitlists, and the city's two main hospitals are sometimes forced to accommodate individuals waiting for long-term care in acute-care settings. (Schliesmann, 2016) While a wealth of research has made the connection between exposure to nature and mental wellbeing (Cameron et. al., 2020; Grinde, 2009; Hunt, 2022; Verderber, 1980), Ulrich (1984) identified its potential physical benefits when he found that post-operative patients who had views of nature required less potent pain management and recovered more quickly. As it becomes increasingly necessary for Kingston to invest in expanding its health-care infrastructure, the city is presented with an opportunity to create environments of care that incorporate nature-based approaches to design to support health through every stage of life, enhance patient care experiences and promote community wellbeing. By exploring global innovations in health architecture that use evidence-based design and emphasize connectedness to nature, this paper seeks to build a frame of reference for a future of better care in the city of Kingston.

Regional health workforce planning for integrated care models: Application of a workforce planning toolkit in one Ontario Health Team

Presenter: Alisa Robinson & Annie Webber
Faculty Supporter: Dr. Catherine Donnelly, Health Services and Policy Research Institute, Queen's University

Background and Objectives: Canada is experiencing a health workforce crisis. Integrated models of care, including Ontario Health Team (OHTs), are important examples of large-scale reform focusing on local populations and a regional health workforce. To ensure a workforce meets population needs, we must use a regional approach to workforce planning. While significant work has been published on health workforce planning, few examples of how regional integrated care systems can apply workforce planning models to address population needs exist. This project aims to inform policy to support regional workforce planning for integrated care strategies.

Methods: Using an exploratory mixed methods single case study design, an OHT including rural and urban populations served as the case. The selected Health Workforce Planning Model (HWPM) identified in a scoping review was applied. A mixed methods approach included multiple regional, provincial and federal data sources to describe the population, health needs and service providers. Document analysis of publicly available workforce planning documents across all OHTs was completed. Discrete analysis was conducted for quantitative data.

Results: Using the HWPM, data was captured regarding service requirements (population data demographics, health status, health services utilization) and capacity (health workforce) to identify potential gaps. 6 federal/provincial data sets were used to describe the population. 19/93 regional organizations completed surveys to obtain workforce data. Review of 54 OHT websites found only 12 had documents mentioning health workforce planning, including strategic plans (66.7%) and other reports.

Conclusions: Key recommendations focused on the need for: health workforce planning governance structures and accountability provincially and within OHTs; standardized and comprehensive data and reporting across sectors; and infrastructure at the provincial level and within regions to support health workforce planning

Session F: Art/Drama/Music

Friday, March 7, 11:45 AM-12:55 PM

The 1966 Reading Room, Douglas Library

Moderator: Cory Laverty, Research and Teaching Librarian: Art, Drama, and Music

The Reduction of Identity: How consent changes everything in street photography
Presenter: Carolyn Kane

Street photography as a genre is known for being quick, capturing a brief moment in public. Bruce Gilden (b. 1945) is a famous American street photographer based in New York, and known for his up-close flash photos, taken without the consent of the subject. Vivian Maier (1926-2009) is a mysterious figure, none of her street photographs were published during her lifetime which leaves many questions about her intent. Although Gilden and Maier are very different artists separated by time, both provide insight into the lack of control of a subject in their chosen genre. While the photos taken by Gilden and Maier depict the physical likeness of a person, I will argue that they are not portraits aimed at capturing a person's likeness and identity. The distinction between street photography and portraiture lies in the subject's ability to curate or exert control over how they are portrayed. By examining this disparity, I will show that when consent is not given, the resulting reduction becomes a potent manifestation of powerlessness, as the subject's identity is distilled into an image that may fail to accurately reflect their sense of self; thus, the photograph separates the identity of a person from their physical likeness. This presentation is an exploration of how photography can neglect identity to focus on a particular moment in time.

Bionic Bodies — Exploring "Moist Media" at the Intersection of Psychedelic States, Technology and Queer Perspectives through Print Media Practises
Presenter: Kelby Paquette-Anderson

This research explores the convergence of 'wet' and 'dry' modalities in visual and material processes to reimagine the 'bionic' body as a site of syncretic and transformative potential. Rooted in Roy Ascott's theory of syncretism—finding unity between unlike things—and Legacy Russell's glitch theory, the thesis creation positions non-binary and queer identities as active agents of disruption, remapping physical and virtual forms. These frameworks intersect with McKenzie Wark's concept of 'hacking' as a mode of creating new relational planes, where seemingly disparate elements converge to unlock new possibilities for identity and representation.

Through the integration of serigraph prints ('wet' processes) with digital editing techniques ('dry' spaces) and their iterative translation back into tangible outputs, the resulting giclée prints embody

"fuzzy ambiguities" and "darting associations" that challenge fixed binaries. This process reflects a syncretic approach that mirrors the experiential overlap of psychedelics and digital interfaces, both of which mediate altered states of consciousness and modes of engagement.

By visualizing and activating a 'moist' framework—an interstitial space between wet and dry—the research situates the body as a fluid site of innovation and resistance, negotiating tensions between materiality and immateriality. It invites critical engagement with systems of power, proposes reconciliations with ancestral and queer ways of knowing, and celebrates the inherent intelligences within glitch and disruption. This research bridges art, technology, and philosophy, offering a speculative vision of bodies as sites of continuous reformation and collective transformation.

The Power of Social Dance as Social Defiance: Liberation, Identity, and Cohesion
Presenter: Ally Colby
Faculty Supporter: Dr. Margaret Walker, Dan School of Music & Drama, Queen's University

There is nothing like music and dance to bring people together. However, social dance venues have been criticized for housing socially defiant behavior alongside this group performance. My research project examines the relationship between social defiance and social cohesion as one that is complementary rather than contradictory. Previous research on this topic generally consists of two opposing voices: one argues that these spaces are sites of danger and health risk (e.g. Sanders 2016), and the other argues for their social and cultural importance (e.g. Kavanaugh & Anderson 2008, Hickling & Hutchinson 2012). I uncover a third perspective, arguing that socially divergent behavior increases these events' capacity to have positive social and cultural impacts.

Through extensive bibliographic research, I discovered that when members of an oppressive group engage in socially defiant behavior alongside group performance within social dance spaces, it allows for personal liberation and the construction of individual and group identities. In my presentation for Inquiry@Queen's, I will reveal this through three case studies: raves (1990s-2000s), Jamaican dancehall (1970s-1980s), and speakeasies (1920s). I selected these case studies because they exemplify "heterotopia spaces" (Foucault 1986) where socially oppressed groups can engage in behavior outside of social norms. In spite of seeming deviant, such contexts offer opportunities for personal liberation from social oppression. Removing the negative lens will expand our view of dance as a powerful tool for social cohesion.

From Catharsis to Critical Discourse: Theatre's Role in Modern Western Democracy
Presenter: Rachel Rusonik

The often cried lament "Democracy is dead!" has been heard again with a new intensity following the 2024 U.S. Presidential Election. Yet in Western representative democracy, political participation has already been largely reduced to only episodic elections, leaving citizens disconnected from most

decision-making. In contrast, theatre and its live communal nature acts as a vessel for inspiring direct engagement, uniting audiences through common embodied experiences. This paper examines the enduring relationship between theatre and democracy, arguing that performance remains a crucial forum for exploring three key democratic tenets: multivocality, political participation, and equality—all integral to any genuine democracy. By drawing on Greek history, politics, and theatre theorists, as well as two contemporary theatre case studies, Porte Parole's The Assembly and The DAN School's The Other Shore, this study explores how theatre has functioned as a democratic tool in Western society since Ancient Greece, where tragedy fostered and cathartically resolved collective concerns in the theatre space, to modern productions that prompt active political discourse. The Assembly, a verbatim documentary theatre piece, mirrors representative democracy by staging condensed pre-recorded political conversations, then briefly allowing audience participation before cutting it off, highlighting unsettling systematic limitations. The Other Shore examines the dangers of groupthink under direct democracy through ensemble storytelling and abstraction, with audiences facing each other, provoking interpretation, critical reflection, and dialogue when exiting the space. Both productions strategically incite the questioning of rigid democratic structures. This paper argues that theatre's liveness—its ability to create diverse ephemeral communal spaces—offers a key alternative to the fragmented nature of representative democracy. In a time of staunch polarization and disengagement, theatre remains a vital democratic tool that disrupts passive spectatorship.

Adaptation and Diegesis of Pre-Existing Music in Historically-Based Video Games
Presenter: Avery Marcella
Faculty Supporter: Dr. Stephanie Lind, Queen's University

The modern state of gaming has seen a variety of interactive narratives play out in a variety of worlds. A major setting of video games is 'the past', including historically-set games which are meant to mimic real epochs and places, all with varying degrees of accuracy to their factual counterparts.

Interestingly, a pattern emerges within the soundtracks of these games: the use of pre-existing, diegetic music. As observed by scholars such as William Gibbons and Andra Ivănescu, such music is frequently chosen to make use of an audience's prior musical associations within the context of the gameworld (Gibbons 2018, 43; Ivănescu 2019, 18-19). However, pre-existing music comes with the risk of misaligning with the player's expectations for a given piece. Additionally, using diegetic music creates an additional risk of misalignment between the observed action and the heard sound (Neumeyer 2009, 31). Combining these two modalities could initially seem to be not worth the collective risks, but games like the historically-based Pentiment (2022) successfully integrate their audio with game narratives through careful curation of pre-existing musical works. What purpose does pre-existing music serve to warrant its widespread inclusion in historically-based games? A comparison of two works from Pentiment, the non-diegetic "Pierro's Pride" and the diegetic "Rüdeger's Rehearsal," will demonstrate how diegetic music is bound by the depicted action, thereby musically reinforcing it, while non-diegetic music takes more liberties in its historical accuracy.

Sonic Branding in Video Game Companies
Presenter: Dominic Everitt

The video game industry is defined by rapid technological development and diverse consumer demographics. Competing brands like Nintendo, Sega, and Capcom drove the industry's development, establishing themselves as household names indelibly linked to the world of video games. Since the medium's inception, these companies have grown in profitability by appealing to broad consumer bases to thrive within their competitive industry: one strategy that is crucial for achieving this is by designing an engaging musical aesthetic. Sound is significant in video games for enhancing immersion (Summers 58-59), communicating emotion and narrative (Plank 293), and fostering player engagement (Alten 377). Developing an aural aesthetic is essential for shaping player experiences and reinforcing brand identity. As "sound is the modality through which the gameworld begins to extend out from the screen and immerse us" (Plank 299), this paper explores how and why game companies sonically brand themselves from three increasingly broadened perspectives. Through the narrowest lens, I discuss the evolution of Sony's PlayStation console boot-up cues to examine branding for marketing. These cues exhibit consistent musical topics despite sonically representing the company's evolution. In a wider-ranging investigation of branding, I analyze the horror aesthetic and its unique applications of interactive music; the imprecision of dissonance and ambiguous meters facilitates interactivity by eliminating constraints like tonality and rhythm. As the largest case study, I discuss the development of Nintendo's aural identity – inspired by 1970s Japanese jazz fusion – and the compositional methods that unify their many contrasting game worlds through a single, constant musical aesthetic.

Session G: Political Science/Business

Friday, March 7, 1:05-2:30 PM

The 1966 Reading Room, Douglas Library

Moderator: Jesse Baker, Research, Instruction & Online Learning Librarian

New World, New Rules: Canadian Cyber Strategy in a Changing Threat Landscape
Presenter: Julian King
Faculty Supporter: School of Policy Studies, Institute of Intergovernmental Relations

The global expansion in reliance on information and communication technologies has thrust the world of cyberspace into the forefront of security studies and strategic discourse. Existing literature has sought to explore the cyber domain as an arena for competition amongst great powers, yet there remains a dearth of literature comprehensively evaluating middle powers in the cyber realm. Cyberspace confronts middle powers with distinct and critical security threats, while simultaneously offering opportunities to assert and expand their position in the global order. Thus, prior thinking surrounding strategic postures for middle powers must be reexamined with consideration given to cyber operations as a tool for statecraft and warfare. Canada, as a digitally advanced and connected middle power committed to upholding the status quo global order, offers a prime case study to explore the question: How can certain middle power states navigate the threat landscape of cyberspace to best protect and promote distinct and shared security interests? Here, I offer the argument for offensive cyber operations (OCOs) as a point of strategic focus, arguing that there is a strong theoretical and practical foundation for Canada to pursue and execute them effectively. I ground this assessment on the principles of 'middlepowermanship' and functionalism, discussing the constraints and opportunities afforded by the cyber domain that make a novel tailored approach for middle powers necessary, and why OCOs might best address this need. I closely evaluate the case of Canada, exploring proposed strategic initiatives and mandates alongside available quantitative and qualitative cyber data to evaluate how such developments are manifesting in cyberspace. I conclude that information to date indicates disappointing shortcomings in Canadian offensive cyber activity, but the robust argument for the merit of OCOs alongside promising changes in Canadian cyber organization support the call for continued development, focus and execution of OCOs moving forward.

Anchoring Bias in AI: Ensuring Accuracy and Integrity in Research
Presenter: J. Adelle Barsky-Moore

Researchers can use artificial intelligence tools to streamline and enhance many steps in the research process. AI can quickly and efficiently curate research questions, identify relevant studies, synthesize prior research and identify gaps, gather and analyze data, and compose research findings and

conclusions. Despite AI's impressive capabilities, its responses are not necessarily accurate, complete, or free from bias. This presentation explores the ethics of responsible use of AI in research through the lenses of accuracy, honesty, and anchoring bias. Anchoring bias refers to a person's tendency to over-rely on initial pieces of information that they receive, potentially discounting or ignoring other information that could confirm or disconfirm the veracity of the initial information. To mitigate this bias, researchers should think critically about AI-generated outputs, rather than over-relying on the first information they receive. This presentation provides researchers with strategies to mitigate the anchoring effect when they use AI in various stages of research: understanding AI's limitations, nurturing awareness of anchoring bias, asking critical thinking questions to evaluate the accuracy of AI outputs, and employing other strategies to verify the accuracy and reliability of AI outputs. While AI can be a valuable research tool, researchers should remain ethically responsible for the rigor of their research methods and the veracity of the findings they report.

Bi-Partisanship a Double-Edged Sword in Western Liberal Democratic Governance
Presenter: Toryn Brady & Sam Berlet

In 2023, the American Congress had one of the lowest bi-partisan voting scores in history, with over 80% of votes split along ideological lines. Political polarisation has paralyzed legislative enactments and has ruined the unity of western liberal democracies, therefore, a study into bipartisanship, its catalysts, and its determinants is essential to maintain our democratic institutions.

Throughout this study, we study bipartisanship through a process of triangulation, using a mix of qualitative and quantitative approaches. This will include the use of voting records, polling, and survey data to seek out a measure of bipartisanship. We will use case studies and the rules of our institutions to explain why bi-partisanship has receded recently and then look at media and speech rhetoric to look at how bi-partisanship is framed in the public eye and their opinions on cross-party collaboration and its subsequent effect on bi-partisanship within legislative bodies.

A series of factors can be attributed to the lack of bipartisanship in our deliberative chambers. Through studies held in the United States of America findings and studies have concluded that a large reason for such political polarization is an assumed over exaggeration of policy differences, a re-alignment of party intentions, misinformation, fact-checking, and electoral incentives.

On the contrary, aides for bi-partisanship can include such factors as: fact-based reporting, education initiatives, civil discourse, open primaries, ranked-choice voting, economic recovery acts, and external threats to a nation's sovereignty or freedoms.

Findings on the factors affecting bipartisanship seem paradoxical. Whilst floor transparency increases partisan theatrics, open committee hearings tend to lower political posturing.

Therefore, we intend to find out how to maximize cordiality, respect, and of course, bipartisanship between ideological lines.

The Efficacy of the NAFTA Professional Visa on Canadian Productivity, Growth and Investment

Presenter: Rishab Chakraborty

From 1990 onwards, NAFTA brought free trade and movement across the three nations – Canada, the United States and Mexico. Atypical to most free trade agreements, the North American Free Trade Agreement brought the free movement of labour with dozens of labour visas catered towards acute American labour shortages. NAFTA had an added NAFTA Professional Visa most colloquially known as the TN Visa.

Annually hundreds of thousands of highly skilled Canadians and Mexicans move into the United States using the TN Visa. Contrary to the H1-B Visa, the most akin to the TN Visa, the TN-Visa had no limit, peaking at nearly 900,000 applicants in 2011. The Visa had no cap or restriction on the number of applicants and time spent in the country for work and required the applicant rather than the American corporation to apply.

The methodology behind implementing such as migration policy was to fill and bolster much of the highly skilled knowledge work in the United States. The effectiveness of the policy has been bolstered by nearly all mainstream economists and furthered by many as a push towards establishing a 'NAFTA Labour Market'. However, the implication on the Canadian labour market has been understudied and is a topic ripe for discussion.

A big proportion of Canadian emigration using the TN-Visa has been from the Knowledge Sector, more specifically information services. This was the silent emigration of much of Canadian top technical talent, all while Canada continues to face labour constraints in key industries.

The findings in this paper navigate the complex interplay between sectorial and geographic dynamics, wage resilience factoring in differing policy regimes such as Temporary Visa and Student Work Permits using various econometric and statistical tools and analysis. This paper observes the opportunity cost these labour policies have had on Canadian economic growth.

Informing Community Coalitions Through the Use of Existing Databases to Inform Drowning Prevention Action

Presenter: Briar McCaw
Faculty Supporter: Dr. Jennifer Carpenter, Faculty of Health Sciences, Queen's University; Dr. Stephen Beerman, University of British Columbia

Introduction: Drowning is a leading cause of unintentional injury-related deaths, claiming approximately 300,000 lives annually.1 Beyond the immediate loss of life, its impact extends to families, communities, and healthcare systems. Drowning is defined as the process of experiencing respiratory impairment from submersion or immersion in liquid, with outcomes classified as fatal or non-fatal.2 In

non-fatal drowning, respiratory impairment is stopped before death.2,3 Recent efforts aim to improve drowning incident reporting for a clearer understanding of its burden and effective interventions. Despite its global impact, drowning remains a neglected public health issue with limited research attention.

Objectives: This study aims to analyze drowning mortality data from 2011 to 2019 within Elgin, Middlesex, London, and Oxford counties to inform the Elgin County Drowning Prevention Coalition's (ECDPC) community-based initiatives The study seeks to identify priority recommendations for community action, policy development, and future research to support local drowning prevention efforts.

Methods: A retrospective analysis was conducted on water-related fatalities that occurred in the four counties between January 1, 2011, and December 31, 2019. Key variables examined included sex, age group, body of water, time of year, activity type, purpose of activity, accompaniment, and whether a rescue was attempted. These variables provided a comprehensive overview of drowning incidents and patterns.

Results: A total of 40 water-related fatalities in the region were identified during the study period. Regional rates compared to provincial rates were higher in bathing and pool fatalities, with an increase in ages 15-64. Conversely, boating fatalities and drownings among those aged 65+ showed a decline.

Conclusion: The novel use of regional and community-specific data are essential for developing evidence-based drowning prevention strategies. Findings suggest a need for tailored prevention efforts and improved non-fatal drowning data collection to assess the full burden of drowning in the community.

Canada's Involvement in Overseas Conflict: Navigating International Engagement
Presenter: Elizabeth Liteplo
Faculty Supporter: Dr. Caroline Dunton, Department of Political Studies, Queen's University

The purpose of this research is to develop informed recommendations on the appropriate nature and scope of Canada's future involvement in overseas conflict based on a review and analysis of Canada's involvement in the past. With conflict around the world increasing in frequency and complexity and the potential for catastrophic consequences, it is more important than ever that the Canadian Government develop appropriate foreign policy for Canada's involvement in overseas conflict that reflects Canada's capabilities, including both its strengths and limitations, to ensure that Canada maximizes its influence and positive contribution while minimizing its risks. This research aims to contribute to this development. Using the case studies of Canada's intended peacekeeping role in former Yugoslavia and nation-building role in Afghanistan, this research means to answer the following: How should Canada's past involvement in overseas conflict, both diplomatically and militarily, influence its future involvement in overseas conflict? In former Yugoslavia, many Canadian peacekeepers were sent to the region and, working with other states, successfully helped achieve lasting stability. In Afghanistan, the

results differed drastically from the former. Canada and its allies faced what ultimately proved to be insurmountable opposition, suffered the loss of substantial human and other resources, and failed to achieve stability and peace. These vastly different cases illustrate the strengths and successes as well as the flaws and shortcomings associated with Canada's involvement. From that vantage point, this research looks to make informed recommendations on how Canada should address future conflicts to maximize effective, successful participation and minimize its risk, taking into account the available resources and state relations.

Session H: Health Sciences II

Friday, March 7, 2:30-4:30 PM

The 1966 Reading Room, Douglas Library

Moderator: Deirdre Bryden, Archivist

Comparative Systematic Analysis between High Intellectual Potential and High Functioning Autism: A Research Study
Presenter: Arani Hiritharan

Introduction: Neurodivergence encompasses a range of conditions, including High Intellectual Potential (HIP) and High-Functioning Autism (HFA). These conditions, often viewed as contrasting ends of a spectrum, present diagnostic challenges due to overlapping traits, particularly in clinical, cognitive, and social domains. This systematic analysis explores the extent of their similarities to improve diagnostic accuracy and treatment outcomes.

Methods: A systematic review of peer-reviewed articles was conducted, focusing on diagnostic criteria, cognitive & psychometric factors, clinical & neurophysiological features, sensory modulation and etiology of HIP and HFA. Data sources included studies utilizing diagnostic tools such as DSM-5 and WISC-IV. Due to a lack of articles directly comparing HIP and HFA cross-referencing and cross-analysis of studies was used.

Results: HIP individuals demonstrated superior cognitive and psychometric functioning compared to those with HFA. When examining clinical features, both groups exhibited autistic traits, with HIP showing a lower prevalence than HFA. Clinical and neurophysiological evaluations also highlighted nuanced differences, supported by varying international diagnostic criteria. Etiological findings revealed common developmental influences, including atypical brain hemisphere symmetry and fetal testosterone exposure. Both groups shared sensory modulation challenges.

Conclusion: HIP and HFA exhibit significant similarities across several domains, but nuanced differences and the scarcity of direct comparative studies prevent a definitive conclusion regarding their convergence. Misdiagnosis risks highlight the need for precise diagnostic criteria and standardized assessments. Future research must directly compare these populations with diverse demographics to enhance operationalization and construct validity. Standardized global diagnostic frameworks is a necessity to enhance accuracy and reduce diagnostic bias.

Emotional regulation in Preschoolers with Autism Spectrum Disorder: A PRISMA Style Review
Presenter: Ricky Leigh

Objective: Emotional regulation (ER) is a critical developmental skill often disrupted in autistic preschool-aged children, negatively impacting their adaptive functioning, parental well-being, and broader developmental outcomes. This scoping review aims to synthesize existing literature on ER in autistic preschoolers, providing an overview of current research, identifying intervention strategies, and highlighting methodological gaps to inform future research.

Methods: A systematic literature search was conducted using PRISMA guidelines, identifying 17 studies that investigated ER in autistic preschoolers. Inclusion criteria focused on studies examining ER in preschool-aged children (ages 2-6) diagnosed with autism, while exclusion criteria filtered out studies lacking direct relevance to ER or those focused on older populations.

Results: Results indicated that autistic preschoolers demonstrated heightened emotional reactivity, prolonged emotional recovery times, and a reliance on maladaptive or caregiver-supported ER strategies. Intervention strategies, such as parent-mediated programs and cognitive-behavioral approaches, showed measurable changes in improving ER abilities and enhancing caregiver confidence in this population. However, the review also highlighted significant gaps in literature, including inconsistent use of validated tools across studies, limited representation of culturally and socioeconomically diverse populations, and a lack of longitudinal data.

Conclusion: The findings of this scoping review hope to underscore the importance of ER in autistic preschoolers and the need for culturally inclusive research and standardized methodologies to guide effective interventions and support improved developmental outcomes.

Exploring the Therapeutic Potential of Transcutaneous Vagus Nerve Stimulation in ALS-Related Inflammation and Depression
Presenter: Ishaann Bakirathan, Andrew Ogbuehi, Angel Ngo, Arani Hiritharan, Byran Ruban

Introduction: Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disorder characterized by progressive motor neuron loss and muscle control impairment.[1,2] Chronic inflammation, driven by elevated cytokines, exacerbates ALS symptoms. Since ALS patients typically maintain cognitive function, they are aware of their symptoms, which can lead to depression. Depression amplifies the inflammatory response in ALS patients creating a self-perpetuating cycle.[3,4,5,6,7] Transcutaneous vagus nerve stimulation (tVNS) is a non-invasive method shown to reduce inflammation in other conditions, but remains unexplored in ALS and comorbid depression.[5,8,9,10] This study investigates the therapeutic potential of tVNS in mitigating the positive feedback loop between ALS, depression, and inflammation.

Methods: Fifty adults (18+), diagnosed with ALS and comorbid depression, will be randomly allocated to the treatment or control group in a double-blind study.11,12,13,14 tVNS will be delivered via Ag/AgCl electrodes on the left ear twice daily for thirty minutes, five days per week, for twelve weeks, starting at 1 mA, with current adjusted based on participant tolerability.12 Treatment groups will receive stimulation at the left inner tragus, targeting vagal afferents, while control groups will receive stimulation at the left posterior earlobe, a site with minimal vagal innervation.11 Cytokine levels (IL-1β, TNF-α, IL-6) will be quantified through RT-qPCR. Depression and ALS symptoms will be measured at baseline, post-treatment, and six months post-intervention, using the ALS Functional Rating Scale-Revised and American Psychological Association's Severity Measure for Depression.15,16 Data will be analyzed using a two-way mixed ANOVA.

Findings: We anticipate reduced cytokine levels and improved ALS & depression symptoms in the treatment group compared to controls. These findings have potential to holistically enhance quality of life for ALS patients, alleviating physical and psychological burdens.

Applying Machine Learning for Early Detection of Autism Spectrum Disorder from Maternal Microbiome Data
Presenters: Alexandra Giff, Cameron DeBellefeuille, Georgia Apostolopoulos, Salma Elsayed

Recent research has shown that those who have an inherited predisposition to autism spectrum disorder (ASD) demonstrate a strong association between gut microbiome dysbiosis and brain development through the gut-brain axis. Previous studies demonstrate that this predisposition is predominantly vertically transmitted from mother to child during labour and through breast milk. During this transmission step, several bacterial strains acting as biomarkers in the maternal gut microbiome have been shown to be conserved in the child. Current ASD diagnostic methods rely on behavioral assessments and genetic screening, often delaying intervention and placing additional stress on mothers during early parenthood. Utilizing maternal gut microbiome biomarkers in adjunct with genetic screening could provide a non-invasive screening tool that could enable timely risk detection, facilitating early interventions that improve developmental outcomes and reduce parental anxiety. To achieve this, we leverage random forests, a supervised machine learning algorithm that has been shown to accurately classify microbiome samples as originating from children with ASD or neurotypical children. Additionally, the bacterial species Bacteroides, Lachnospira, Anaerobutyricum, and Ruminococcus torques have been identified as strong biomarkers for ASD. The aim of the study is to evaluate the predictive accuracy of maternal gut microbiome data for pre screening for children with ASD, and validate whether previously identified biomarkers for ASD are conserved in maternal gut microbiome samples. Using samples from a mother's gut microbiome to determine risk could revolutionize early ASD identification and diagnosis. Considering the connection between genetics and microbiome composition, this approach strengthens traditional genetic screening, offering a more comprehensive risk assessment. Further, by preparing parents earlier in their pregnancies, they can sooner explore supportive therapies, adjust prenatal and postnatal care, and access support systems.

This proactive strategy could ultimately improve developmental outcomes, reduce diagnostic delays, and contribute to a deeper understanding of ASD's environmental and biological influences.

Social prescribing and students: A scoping review

Presenter: Han Shu Pu & Tarek Hussein

Faculty Supporter: Research Working Group of Canadian Social Prescribing Student Collective, Queen's University

Social prescribing involves identifying a person's non-medical, health-related social needs, where they are connected to non-medical supports and services. Since the social prescribing movement is rapidly expanding to over 20 countries globally, students play a role in meaningfully contributing, taking on the connector role, or benefitting. Yet, no studies describe the extent and type of evidence on social prescribing and students. We aim to contribute to the evidence base on social prescribing and investigate the numerous intersections and reciprocal influence between social prescribing and students. We sought to understand (1) the extent and types of evidence on social prescribing and students and (2) the knowledge gaps in the evidence base around social prescribing and students. We included evidence sources where the participants are labelled as students, with no age limits and considered references with interventions that aligns with the conditions set that reflects the definition of social prescribing. Both published and unpublished literature will be included, following our protocol registered on Open Science Framework and the JBI methodology for scoping review. Two independent reviewers completed the data extraction, with a discussion or third reviewer used to address conflicts. Grey literature searches did not yield any applicable evidence sources. We seek to provide information about the participants, concepts, programs, study methods, and outcomes from the 18 evidence sources that met the criteria. Social prescribing is a solution to address the limitations of conventional medical practices where student involvement is crucial as they are the future leaders in research, policy shaping, and implementation of social prescriptions. The authors are involved in the Canadian Social Prescribing Student Collective. This novel study, co-created by students in undergraduate and graduate programs, will encourage the participation of students in social prescriptions, identify specific knowledge gaps, and include student perspectives.

Assessing VO$_2$max Trainability: The Role of Standard Deviation in Individual Response to Aerobic Exercise

Presenter: Ahmed Mudwi

Background: Despite extensive research on the effects of exercise training on VO2max, current literature still lacks to be more conclusive regarding the optimal protocols for maximizing these effects. Variability in study designs, participant populations, and measurement techniques has contributed to inconsistencies in findings, leaving important questions unanswered regarding the most effective

exercise strategies. This systematic review aimed to assess whether significant inter-individual differences exist in VO$_2$max trainability across different aerobic training protocols, using non-exercising comparator groups.

Methods: A comprehensive literature search was conducted using Covidence, a web-based platform for systematic reviews to screen studies from three databases: EMBASE, PubMed, and SCOPUS. The search focused on two key concepts VO$_2$max and aerobic exercise training. Studies were included if they met the following criteria: involved human participants, implemented supervised and standardized training protocols, measured absolute or relative VO$_2$max, included a non-exercising control group, reported VO$_2$max change scores for both groups, and provided standard deviation (SD) of change. The standard deviation of individual response (SDIR) was calculated to evaluate variability in trainability across studies.

Results: Out of 32,968 screened studies, 24 met the inclusion criteria and were analyzed. The findings indicated that: (1) most observed variation in VO$_2$max change scores can be attributed to measurement error, (2) estimating SDIR from a single study lacks precision due to typically small sample sizes, and (3) meta-analysis of SDIR across studies does not provide compelling evidence for meaningful inter-individual differences in VO$_2$max response.

Discussion: While past research has debated whether some people respond better to aerobic training than others, our findings indicate that much of the variation in VO$_2$max improvements is due to measurement error rather than true biological differences. One major challenge in studying VO$_2$max trainability is the small sample sizes in most studies. When only a few participants are included in a study, it becomes difficult to tell whether differences in VO$_2$max improvements are real or just due to random variation. Even when data is combined across multiple studies in a meta-analysis, there is still no strong evidence that meaningful individual differences in VO$_2$max response exist. Another factor that complicates this research is the inconsistency in training programs, participant characteristics, and VO$_2$max measurement methods. Differences in exercise intensity, duration, and frequency, as well as variations in how VO$_2$max is tested, make it harder to compare results across studies. If future research aims to better understand VO$_2$max trainability, it will need more standardized training protocols and measurement techniques. These findings also challenge the idea that some people are naturally "high responders" or "low responders" to aerobic exercise. Instead of focusing on predicting individual responses, training programs should prioritize general strategies that help most people improve their VO$_2$max. If true individual differences in trainability exist, they are difficult to detect with the methods currently used.

Conclusion: The meta-analysis does not support the existence of strong inter-individual variability in VO$_2$max trainability within single interventions. Consequently, the likelihood of identifying clinically significant predictors of VO$_2$max response appears to be low.

Investigating DNA-damage responsive long non-coding RNA (lncRNA)

Presenter: Lindsay Yu

Faculty Supporter: Dr. Sujeenthar Tharmalingam, NOSM University

The human genome is routinely subject to endogenous (e.g. oxidative stress) and exogenous (e.g. radiation, UV) factors that induce DNA lesions. These lesions may accumulate and impair cell function or cause cancer. Hence, DNA damage repair and preservation are prerequisites for normal cellular function and maintaining genome integrity. Current research suggests that long non-coding RNAs (lncRNA) play a role in DNA damage response (DDR). lncRNAs are RNA transcripts >200 nt that do not code for proteins. After transcription, they interact with DNA, protein, mRNA, or other non-coding RNA to influence gene expression and protein function. However, there is a lack of research concerning the role of lncRNA in DDR. This study aimed to investigate and quantify the expression of DNA-damage-responsive lncRNAs in a time-course experiment. To do so, human embryonic kidney 293T (HEK293T) cells were exposed to ionizing radiation (IR) at 2 Gy to induce 60-100 double-stranded breaks (DSB) per cell. Following this exposure, RNA was collected at 4 different time points (1, 4, 8, and 24 hrs). Finally, Real-time Quantitative PCR was performed to quantify the expression of select lncRNA genes. Our findings demonstrate an association between DDR and lncRNA gene expression. We found a temporal upregulation or downregulation of lncRNA genes, specifically ENSG00000250519, ENSG00000231595, ENSG00000254338, and ENSG00000223749. The influence of DNA lesions on the expression of these lncRNA increased over 24 hrs. This finding asserts that lncRNA is an epigenetic regulator that may influence signalling networks related to DNA damage. Hence, lncRNAs may serve as biomarkers for the diagnosis, treatment, and prognosis of cancer and other diseases.

Mold Inhalation Modulates Innate Immune Cells in the Lungs

Presenter: Max Housefather

Faculty Supporter: Dr. Eva Kaufmann, Biomedical and Molecular Sciences, Queen's University

Aspergillus fumigatus is a ubiquitously present fungal pathogen and household mold. While inhalation of A. fumigatus in immunocompetent individuals can be associated with increased host susceptibility to infections and allergy, the mechanisms underlying these effects are unknown. Interestingly, exposure to the fungal vaccine adjuvant β-glucan epigenetically reprograms hematopoietic stem and progenitor cells (HSPCs) and thereby enhances host resistance to infection, mediated through "improved" innate immune cells. We hypothesize that A. fumigatus exposure, in contrast to β-glucan, maladaptively reprograms HSPCs, resulting in an impaired innate immune response to subsequent stimuli.

To investigate this hypothesis, we intranasally administered a subclinical dose of A. fumigatus allergen (AFA) or saline to C57BL/6 mice. On days 7 and 30 post exposure, quantitative alterations in lung immune cell and bone marrow HSPC populations were characterized by flow cytometry. To determine

the functional implication of mold inhalation on myeloid cells, bone marrow-derived macrophages were generated from the bone marrow cells of saline- and AFA-exposed mice.

Interestingly, we found long-term elevated levels of granulopoietic and myeloid cell populations in the lung after AFA exposure. However, the functional repertoire of macrophages remained unchanged, suggesting that quantitative, rather than qualitative changes mediate the long-term effects of AFA exposure. Mold exposure occurs in up to 40% of Canadian houses. Determining the pathophysiology of mold exposure in immunocompetent individuals will allow for development of targeted treatments to alleviate long-term detrimental consequences.

Deciphering the Influence of the Immune Environment on Trained Immunity Induction
Presenter: Sarah Hopkins, Conrad Pietrzak, Vidthiya Jeyanathan, Andisheh Liaghat, Will Taylor, Sara Teimouri Nezhad, Colleen Tordoff, Faith Brennan
Faculty Supporter: Dr. Eva Kaufmann, Biomedical and Molecular Sciences, Queen's University

Trained immunity is a novel vaccination concept that enhances innate immune responses through epigenetic reprogramming. Targeting trained immunity provides tremendous opportunities for vaccine generation against infections and conditions in which classical, adaptive immunity failed to provide protection (e.g., Tuberculosis, sepsis).

For clinical application, the robustness of vaccination strategies in heterogenous populations is crucial. Diverse baseline immune statuses originate from genetics as well as persistent conditions, e.g., chronic infections and allergies. To date, the extent to which the host's baseline immune status impacts trained immunity generation is unknown.

To evaluate vaccine robustness across different immune environments, we have tested trained immunity-inducing vaccination in mouse models of both pro-inflammatory and pro-allergic skewed immune systems. To that end, we administered β-glucan, a potent inducer of trained immunity, to mice of different genetic backgrounds with or without established allergic sensitization and challenged these mice in sepsis experiments. Immune responses were measured by flow cytometry. While trained immunity vaccination conferred host protection independent of the immunological background of the mice, protection was mediated through different pathways.

Characterizing the impact of immune environments on trained immunity induction will strengthen clinical translation and enable host-directed adaptation of these next generation vaccines.

Investigating the Systemic Effects of Cat Allergen-Induced Allergic Rhinitis
Presenter: Wil Taylor
Faculty Supporter: Dr. Eva Kaufmann, Biomedical and Molecular Sciences, Queen's University

8.5 million cats live in Canada, approximately in every third household. However, one in five Canadians is allergic to cats, often in combination with other allergic diseases. To date, only symptomatic treatments are available for cat allergies, but no prevention or cure. To improve treatment options for cat-allergic individuals, we need to better understand the mechanisms underlying this common cause of rhinitis.

While clinical data provide important insights into immunological phenotypes and symptom severity, preclinical models allow for dissection of the immune response throughout the whole organism, and across a long timespan. Notably, the main effector cells mediating allergic rhinitis –eosinophilic granulocytes– derive from hematopoietic stem cells (HSCs). HSCs reside within bone marrow (BM) –a location far from the nose as primary site of the allergy. Based on previous studies on respiratory infections, we hypothesize that sensitization to cat allergens in the nose initiates HSC activation and expansion in the BM. These HSCs produce eosinophils that are epigenetically programmed for rapid and strong reaction upon allergen encounter, perpetuating allergic sensitization.

We have established a preclinical model for cat allergen-induced rhinitis in which wild-type C57BL/6 mice are intranasally exposed to cat dander, mimicking human sensitization. Similar to our clinical study, eosinophils increase in the nasal mucosa upon cat allergen exposure in mice. We are now testing the systemic changes occurring throughout allergic sensitization and challenge. Specifically, we will analyze immune cell and HSC populations in lung, blood, and BM by flow cytometry. We will compare the phenotypes of these cells with effector eosinophils in the nose during allergen exposure.

Using mice for the investigation of cat allergy enables us to trace eosinophil migration and systemic distribution of these potent allergy-promoting cells. These insights are fundamental to determining novel intervention foci, and to understanding how cat allergy links with other allergic diseases.

Evaluating Intravenous Albumin Usage in Surgical Oncology: A Systematic Review and Meta-Analysis
Presenter: Aviva Moses
Faculty Supporter: Drs. Jeannie Callum and Wiley Chung, Medicine, Pathology & Molecular Medicine, Queen's University

Background: Intravenous (IV) albumin is commonly used in perioperative care, yet its role in surgical oncology remains unclear. Despite its higher cost and associated risks compared to crystalloids, albumin usage varies significantly in oncology surgery, and no clear clinical guidelines exist. Prior studies in other surgical fields have shown no significant benefit of albumin over crystalloids in patient outcomes, raising questions about its efficacy and necessity in oncology surgery.

Objective: This systematic review and meta-analysis aims to evaluate whether IV albumin administration improves patient outcomes in surgical oncology procedures compared to alternative strategies, such as crystalloids.

Methods: Following Cochrane and PRISMA guidelines, a comprehensive literature search will be conducted across EMBASE, MEDLINE and Cochrane databases. Eligible studies will include randomized controlled trials (RCTs) comparing IV albumin to alternative fluid strategies in oncology surgery procedures. A panel of experts will rank reported outcomes based on clinical importance, with only those deemed important and critical to decision-making included. All references identified through databases will be screened independently and in duplicate in Covidence. Data extraction and risk of bias assessment will be performed independently and in duplicate. Meta-analysis will employ a random-effects model, with statistical heterogeneity assessed using the I^2 statistic. Certainty of evidence will be evaluated using the GRADE approach.

Preliminary Results: A manual search identified four relevant studies examining albumin use in pancreatectomy, upper gastrointestinal cancer surgery, bladder cancer cystectomy, and colorectal cancer tumor resection. All studies found no improvement in postoperative outcomes with albumin administration compared to crystalloids or no albumin.

Conclusion: This review will provide critical insights into the clinical effectiveness of IV albumin in surgical oncology, helping to inform evidence-based perioperative care guidelines and optimize healthcare resource allocation.