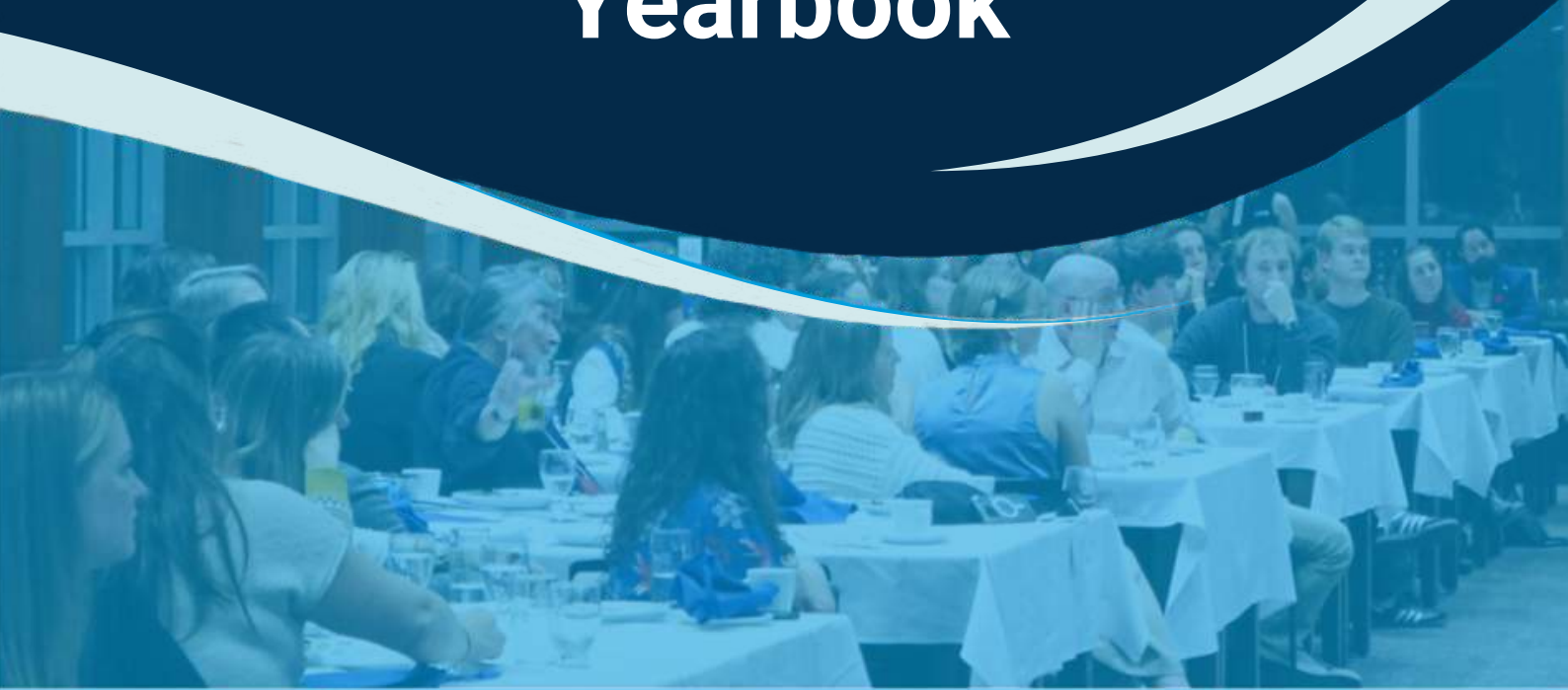
Science Atlantic | Science Atlantique

2025-2026 Student Awards Yearbook



Executive Director's Message

It is a pleasure to welcome you to the 2025-2026 Student Awards Yearbook.

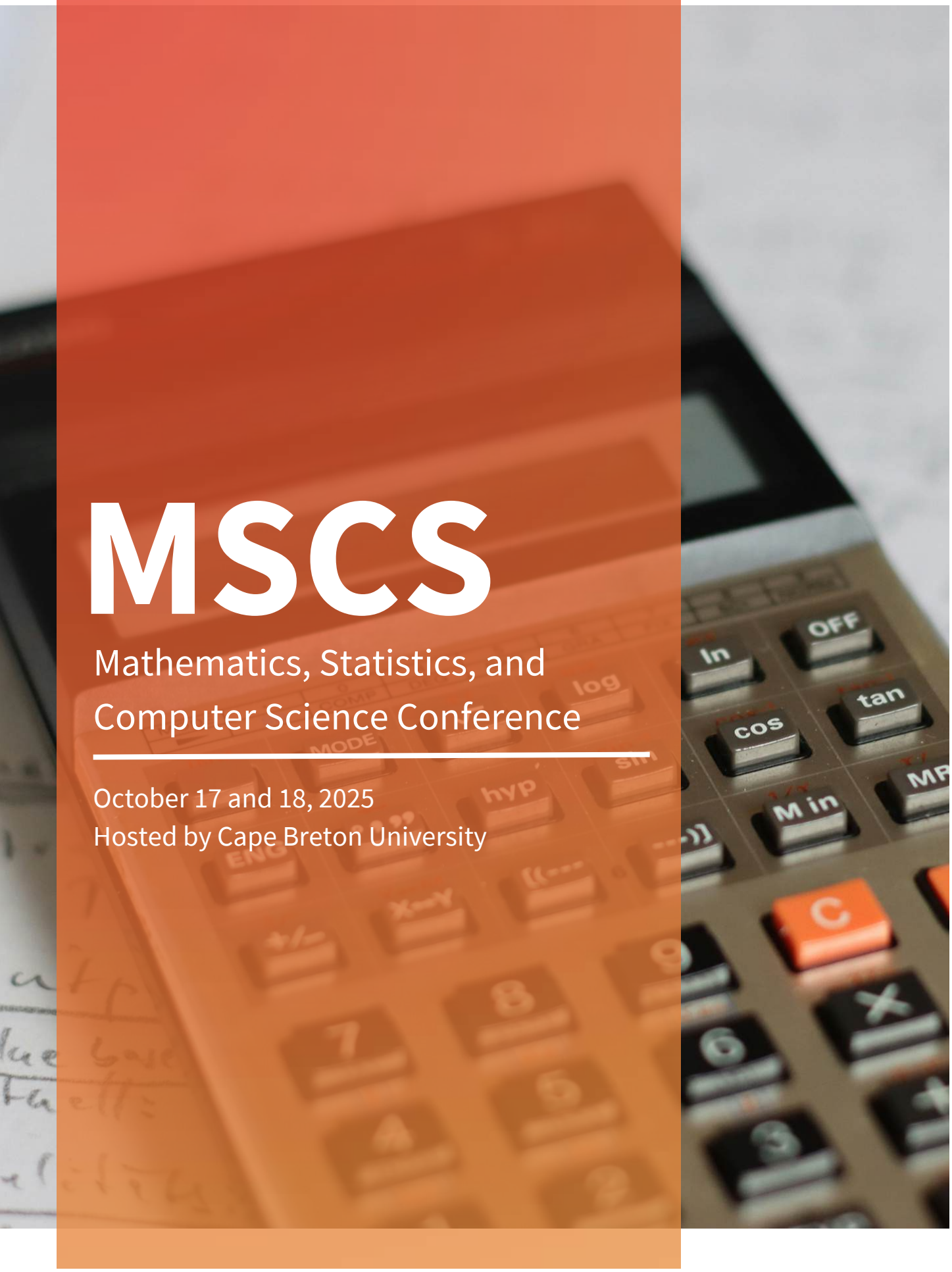
This year, a record 114 students were recognized for their exemplary research and presentation skills at our eight annual student conferences. Please join me in congratulating them on their achievements!

As you look through the following pages, take a moment to appreciate the breadth of science disciplines and research topics chosen by the presenters. The work of these award-winning students reflects curiosity, dedication, long hours, and hard work. They are the bright future of our Atlantic Canadian scientific community and are already contributing to the body of knowledge generated in our region.

Science Atlantic conferences are often the first time students have the opportunity to present their research in a formal setting. These events extend education beyond the classroom, exposing students to new and different perspectives. They also create opportunities for participants to connect with their peers and faculty from other institutions, with each interaction continuing our 65-year network of Atlantic scientists.

None of this would be possible without the immense efforts of conference organizers and the generous support of our sponsors. Thank you for making these opportunities possible for our students.

Lois Whitehead

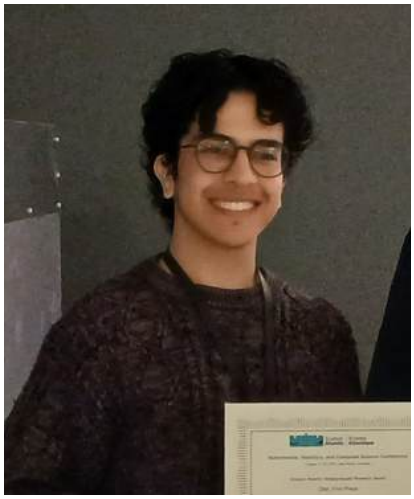


MSCS

Mathematics, Statistics, and Computer Science Conference

October 17 and 18, 2025
Hosted by Cape Breton University

Science Atlantic Undergraduate Research Award



FIRST PLACE

Jonathan Zul Luna
University of Prince Edward Island

A Human-in-the-Loop Pipeline for Accelerating MSX Diagnosis in Eastern Oyster (*Crassostrea virginica*) Histology

Jonathan Zul Luna[1]
[1] *University of Prince Edward Island*
Supervisors: Kristina Kupferschmidt, Andrew Godbout

The Eastern oyster (*Crassostrea virginica*) aquaculture industry, a key economic driver for Prince Edward Island, faces a persistent threat from the parasite Haplosporidium nelsoni (MSX). In the Atlantic Veterinary College (AVC), the primary diagnostic center for MSX in Atlantic Canada, diagnoses rely on a small number of experts manually reviewing histopathological slides containing multiple oysters per slide. Due to the extremely large image size and level of detail, manual review is known to be time-consuming and expensive. We propose an automated, high-throughput analytical workflow to support and scale the current review workflow, allowing for better monitoring of Eastern oysters. The first step in building such a system is the robust instance segmentation of individual oysters on each slide.

To achieve this, we developed a hybrid pipeline. Our method first uses a classical computer vision (CV) workflow to generate prompts that guide a pre-trained Segment Anything Model (SAM) in performing a high-fidelity segmentation. The best resulting mask is then automatically selected by comparing its fit to a coarse tissue map using the Dice coefficient.

Evaluated on a dataset of 21 annotated slides and benchmarked against a purely classical Watershed algorithm and a supervised U-Net model, the hybrid SAM pipeline achieved a mean Dice Score of 0.9287, substantially outperforming both the Watershed (0.8084) and the U-Net (0.6967) approaches.

This segmentation module is the foundational component of a Human-in-the-Loop (HIL) tool for rapid, large-scale slide annotation, paving the way for a production-level, AI-assisted MSX detector to support the region's vital aquaculture industry.

SECOND PLACE

Luis Varona
Mount Allison University

Advancements in Graph Bandwidth Reduction

Luis Varona[1], *Nathaniel Johnston*[1]
[1] *Mount Allison University*
Supervisor: Nathaniel Johnston

Given an $n \times n$ matrix A, its bandwidth $\beta(A)$ is defined as the minimum $k \in \{0, 1, \ldots, n-1\}$ such that $A[i, j] = 0$ whenever $|i - j| > k$. Reordering rows and columns to reduce matrix bandwidth has many practical applications in scientific computing and engineering, including solving linear systems, approximating PDEs, and optimizing circuit layout. Namely, there are two bandwidth reduction problems: minimization (minimizing $\beta(PAP^T)$ over all permutation matrices P) and recognition (determining whether there exists a permutation matrix P such that $\beta(PAP^T) \leq k$ for some fixed $k \in \mathbb{N}$). Many algorithms of both types exist in the literature, including several heuristic and metaheuristic approximations to the minimization problem.

We first present some theoretical advancements we have made in the category of matrix bandwidth recognition algorithms, taking ideas from heuristic algorithms to more efficiently build an optimal permutation matrix. We also describe how this line of research has been used to develop a polynomial-time algorithm for "bandwidth $\leq k$" recognition whose exponent decreases as k increases (existing results only include $O(n^k)$ procedures, with complexity increasing as k increases). Additionally, we present a unified interface for bandwidth reduction algorithms (both minimization and recognition), written in Julia. This interface (which also packages our own algorithmic advancements) both provides optimized implementations of many existing approaches and allows for easy extensibility should researchers wish to test new ideas, filling a crucial niche in the current research landscape.

THIRD PLACE

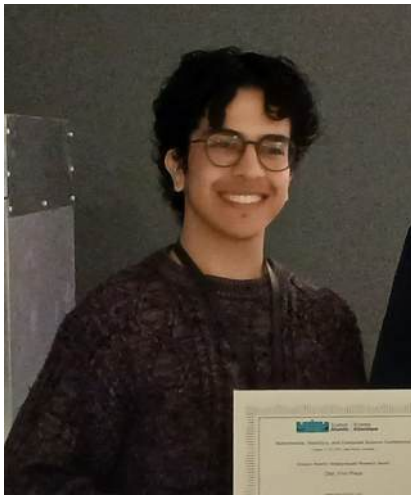
Mohammod Ehsaan Haque
Acadia University

Enhancing Intrusion Detection Systems with CNN+LSTM and SMOTE for Imbalanced Datasets

Mohammod Ehsaan Haque[1]
[1]*Acadia University*
Supervisor: Lydia Bouzar-Benlabiod

Machine Learning Based Intrusion Detection Systems are key defenses in cybersecurity, but they continue to face challenges when trained with large and imbalanced datasets. Datasets like UNSW-NB15 contain millions of network flow records where most of the traffic is normal or dominated by a few attack types. In contrast, many other attack categories appear rarely. This imbalance causes machine learning models to achieve high accuracy on paper but still miss critical, minority- class attacks in practice. This thesis focuses on enhancing IDS performance by integrating data balancing techniques. A hybrid CNN+LSTM model is implemented, where the CNN extracts spatial patterns from network traffic features and the LSTM captures sequential dependencies over time. To address the imbalance problem, SMOTE (Synthetic Minority Oversampling Technique) is integrated as a preprocessing step, generating synthetic samples for under-represented attack classes before training. This approach balances the training data, allowing the model to learn more effectively from minority classes and achieve higher recall for rare attack categories. Model Performance is assessed using metrics that considers imbalance, such as macro F1-score, Matthew's correlation Coefficient, and Precision-Recall AUC, along with confusion matrix visualizations. Results indicate that the CNN+LSTM model with SMOTE significantly improves detection rates for minority attack classes compared to baseline models trained on the imbalanced dataset.

Science Atlantic Science Communication Award



Jonathan Zul Luna
University of Prince Edward Island

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Atlantic Canadian Programming Competition



FIRST PLACE

Hassan Chowdhry, Sebastian Dionicio, Hoang Le
Dalhousie University
The Final Symphony



SECOND PLACE

Patrick Bowen, Dylan Clark, John Kendall
St. Francis Xavier University
X-abytes 0


THIRD PLACE

Alexander Matheson, Matya Stavnitzky, Luis Varona
Mount Allison University
MTA Computer Cats

Atlantic Canadian Programming Competition

About the Atlantic Canadian Programming Competition (ACPC)

The Computer Science Committee has organized a programming competition for Atlantic Canadian universities since 1998. From 1998 until the 2019-20 academic year, this competition was called the **Atlantic Canadian Preliminary Contest (ACPC)**, and served as the first round of the International Collegiate Programming Contest (ICPC). Each year, the top three (or so) teams in the ACPC advanced to the ICPC Northeast North America (NENA) Regional contest. Starting in the 2020-21 academic year, however, the NENA Regional no longer required teams to qualify via a preliminary round, so the ACPC became a standalone event, no longer associated with the ICPC. As a result, ACPC now stands for **Atlantic Canadian Programming Competition**.

On multiple occasions during ACPC's affiliation with ICPC, Atlantic Canadian teams that advanced to the NENA Regional excelled at that level, thereby earning a spot in the ICPC World Finals (Saint Mary's in 2001-02, UNBF in 2002-03 and 2004-05, Mount Allison in 2016-17).

In the ACPC, teams of at most three students are given descriptions of approximately 8-10 problems that must be tackled over a 5-hour period by writing code using the allowed languages. Teams are ranked by number of problems solved, with ties broken using an elapsed-time rule. Awards are given to the top three teams, with the #1 team also earning an entry on the ACPC competition plaque.

In addition, even though the ACPC is no longer part of the ICPC, the Computer Science Committee has established a second plaque that is awarded to the top-ranked Atlantic Canadian team in the NENA Regional each year.

Here you can view results and problem sets from all past ACPC years.

The 2025 ACPC award winners are on page 11 of the Yearbook.

Science Atlantic Undergraduate Research Award, Mathematics

FIRST PLACE

Anna Lukeman
Acadia University

An Adaptation of the Grid Sum Puzzle to Graph Theory

Anna Lukeman[1], *Nancy Clarke*[1], *Danielle Cox*[1]
[1]*Acadia University*
Supervisors: Nancy Clarke, Danielle Cox

This presentation will introduce a vertex labelling process. This process is derived from a game called the grid sum puzzle. In this game the player is presented with an empty grid, and following labelling rules, the player will fill in the grid with numbers. The largest number in the grid at the end of the game is called the maximum sum. This presentation will look at different possible values for this maximum sum and will adapt this game to different types of graphs.

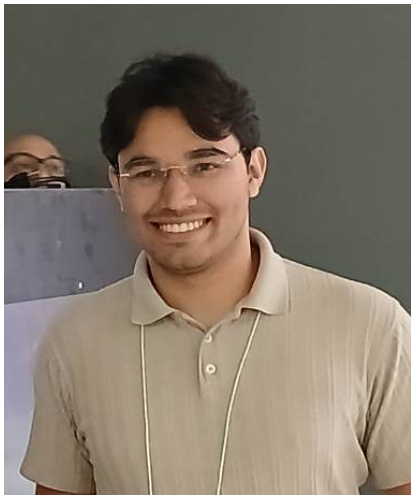
About Science Atlantic Awards

The **Science Atlantic Undergraduate Research Award** is presented to the student (or students) giving the best research presentation(s) at each conference. The award recipients are determined based on the quality of their abstract and presentation, scientific merit of their research, overall knowledge and response to questions, and demonstrated potential to pursue graduate studies and research.

The **Science Atlantic Science Communication Award** is presented to the student (or students) who are best able to communicate a science topic to their peers.

Visit the Conference Awards page on the Science Atlantic website to learn more about awards, prizes, and judging.

Science Atlantic
Undergraduate Research Award, Mathematics



SECOND PLACE

Nimarjeet Bajwa
Acadia University

Failed Zero Forcing Sets on Trees

Nimarjeet Bajwa[1]
[1] *Acadia University*
Supervisors: Iain Beaton, Nancy Clarke

For a given graph G, Fetcie, Jacob, and Saavedra introduced a variant of the zero forcing game called failed zero forcing, where the failed zero forcing number is defined as the size of the largest set which is not zero forcing. In this presentation, we look at the size of the smallest maximal failed zero forcing sets on trees.

THIRD PLACE

Myles Dugas
Université de Moncton

The Unique Factorization of Clustering Words

Myles Dugas[1]
[1] *Université de Moncton*
Supervisor: Mélodie Lapointe

On a 2-letter alphabet, clustering words are called Christoffel words and admit a unique factorization into the product of two clustering words, which we call the standard factorization. This factorization provides a recursive construction of Christoffel words and has close ties with certain algebraic structures. However, those properties may change on larger alphabets. In the case of Christoffel words, the proof of existence and uniqueness relies on their geometric definition. Since those properties are lost on larger alphabets, we rely instead on other characteristics, such as lexicographical order, to establish the existence and uniqueness of this factorization for clustering words on arbitrary alphabets. Moreover, this main result allows us to develop a partial recursive construction of clustering words.

Science Atlantic
Undergraduate Research Award, Statistics

Hemisha Saminathen
University of Prince Edward Island

Exploring Connections Between Causal Inference and Mathematical Finance

Hemisha Saminathen[1]
[1]*University of Prince Edward Island*
Supervisors: Alexander Alvarez, Paul Sheridan

In this study, we use Pearl's framework for causal inference which provide a rigorous way to model cause-and-effect relationships. Backward induction is broadly applied in finance to evaluate sequential choices under uncertainty, and in this work, we adapt it to Pearl's causal framework. We build a sequential model where the system evolves through a series of stages influenced by outside factors, and the outcome depends on the state reached at the end. While the backward induction methodology is at the core of our approach, we also use Monte Carlo simulations as a secondary tool to confirm the validity of the results. The close agreement between the two gives additional confidence in the computations. Our findings suggest that tools from financial mathematics provide a natural and effective way to evaluate interventions in causal models establishing a new connection between these two fields.

Science Atlantic
Science Communication Award, Mathematics

Carter Clifton
St. Francis Xavier University

Understanding Opioid Mortality during COVID-19 - An Individual-Based Model

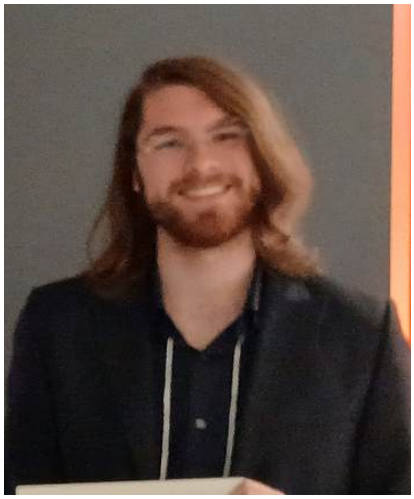
Carter Clifton[1], *Ryan Lukeman*[1]
[1] *St. Francis Xavier University*
Supervisor: Ryan Lukeman

The opioid epidemic is a global public health crisis, with significant impacts across Canada, including over 50 thousand-opioid related deaths since 2016. During the COVID-19 pandemic, the crisis deepened: in Toronto, the number of opioid related fatalities nearly doubled, and has remained high since. To quantify what factors have led to this increase in mortality, we developed an individual-based dynamic modeling framework for the population of people who have opioid use disorder, allowing individual characteristics to determine their specific overdose and mortality risk. We consider factors that include drug supply, demography, use history, and use of harm reduction services.

The model is first parametrized to urban Toronto in 2019. Then, using available data on factors that have changed during the pandemic (e.g., access to supervised injection sites, methadone adherence, incarceration, etc.) we quantify the expected change in mortality due to each cause.

We found that pandemic impacts on these factors account for some increased mortality, but does not explain the large observed increase at that time. Instead, we explain this by a simultaneous increase in the presence of fentanyl in the drug supply. Based on the connection between fentanyl content, and subsequent overdose and overdose fatality, we developed a system of equations to estimate fentanyl presence in the drug supply before, and after, the pandemic. Our modeling work not only accounts for observed mortality increases, but also provides valuable quantitative information on the rise of fentanyl in the illicit opioid supply - important information to guide drug policy in Canada.

Science Atlantic
Science Communication Award, Statistics



Anson Green
University of New Brunswick, Saint John

QFASA - A New Approach With Quadratic Programming

Anson Green[1]
[1] *St. Francis Xavier University*
Supervisors: Connie Stewart, Michail Tsagris

Quantitative Fatty Acid Signature Analysis (or QFASA) is a statistical model that uses fatty acids stored in the adipose tissue of marine predators to estimate their diets. It is used to monitor ecosystem health and stability in the food web and is preferred over direct and other indirect methods of estimation due to their high cost, their lethality to the observed predators, or their bias. The model is subject to tight mathematical constraints, as both the fatty acid data and the diet estimate output take a multivariate compositional form, and as such problems of computation and dimensionality reduction are a big concern. With the use of quadratic programming, however, the problem, minimizing the statistical distance between a linear combination of prey fatty acids and the fatty acid composition of a predator, can now fit within a regression framework, allowing for tighter computation times and the introduction of useful regression methods into the QFASA model. This project constructs trials on simulated data to test the efficacy of some new regression methods against the existing QFASA methods, measuring computation times and the distance from the estimated diets to the true diet to determine whether these new additions produce faster and improved results.

Time permitting, a new LASSO method will also be introduced, allowing for diet estimation when the number of prey species in the model exceeds the number of fatty acids in the dataset, a situation where traditional QFASA methods fail to provide unique solutions.

Science Atlantic Graduate Research Award

FIRST PLACE

Timothy Power
Dalhousie University

A Partial Differential Equation Framework for Modeling Economic Growth

Timothy Power[1]
[1] *Dalhousie University*
Supervisors: Theodore Kolokolnikov, Roman Smirnov

This work develops a novel mathematical framework for modeling energy dynamics in economic systems, combining production theory with spatial diffusion and transport phenomena. The foundation is a reaction-diffusion partial differential equation that extends classical growth models through the incorporation of endogenous spatial coupling effects. The model captures three fundamental equilibrium states whose stability properties are governed by the interplay between production efficiency and depreciation rates. Numerical simulations demonstrate rich dynamical behavior ranging from uniform convergence to spatially modulated transitions and cascading collapse sequences, depending on the structure of spatial coupling parameters.

The analysis reveals how prosperous regions can elevate entire networks through energy redistribution mechanisms, with diffusion processes enabling global stabilization. A second model formulation incorporates explicit transport mechanisms through higher-order spatial derivatives, producing nonlinear coupling terms that capture essential network effects. Traveling wave solutions demonstrate characteristic propagation speeds that scale with system discretization, while numerical implementation via backward Euler schemes provides robust stability for simulating these nonlinear dynamics.

Key contributions include the derivation of coupled production-transport equations from economic first principles, complete classification of stability regimes, and exact solutions for special cases. The framework advances beyond classical growth theories by simultaneously incorporating biophysical constraints, spatial redistribution mechanisms, and transport network effects. These models provide quantitative tools for analyzing infrastructure systems, regional economic development, and energy network design, while demonstrating how geographic relationships fundamentally alter growth predictions compared to traditional non-spatial theories.

Science Atlantic Graduate Research Award

SECOND PLACE

Thiago Holleben
Dalhousie University

Playing Dominoes in the Correct Dimension

Thiago Holleben[1]
[1] *Dalhousie University*
Supervisor: Sara Faridi

A 2D game of dominoes is a generalization of the standard game, where one uses triangles instead of rectangles, and attaches new pieces along edges of pieces that have already been placed. In this talk we will see how this simple game ends up generating interesting objects called triangulations of manifolds. We will then talk about problems in this area, and touch upon which techniques are used to tackle such questions.

THIRD PLACE

Rory Schepp
Dalhousie University

Methods for Improving Compilation of Quantum Circuits to Lattice Surgery

Rory Schepp[1]
[1] *Dalhousie University*
Supervisor: Christopher Dean

A key challenge in quantum computing is implementing quantum programs with effective error correction. Our research investigates improved techniques for compiling quantum programs into lattice surgery operations on surface codes. We present a method that uses the ZX calculus, a graphical language for reasoning about quantum circuits, by leveraging its close operational relationship to lattice surgery. This approach has enabled us to develop compilation strategies that may offer significant advantages for the efficient realization of fault-tolerant quantum computations.

Science Atlantic Mathematics Problem Solving Competition

FIRST PLACE

James Petersen, Irina Xie

University of New Brunswick, Fredericton

SECOND PLACE

Eric Goulding, Gavin Hull

Memorial University of Newfoundland

THIRD PLACE

Phyllis O'Neil, Leah Wilson

Saint Mary's University

Science Atlantic
Mathematics Problem Solving Competition

About the Mathematics Problem Solving Competition

The Mathematics Problem Solving Competition was established 1977 as part of Atlantic Math Days. The contest challenges undergraduate students from Atlantic Canadian universities in a three-hour-long examination.

Students participating in the Mathematics Competition are grouped in teams of two according to their universities. The teams must attempt to solve eight math problems within the allotted time period. They are not allowed calculators, computers, or notes.

Visit the Mathematics Competition page on the Science Atlantic website to see the problem sets from the past 48 years. This year's math problems are available in a PDF format.

The 2025 Mathematics Competition award winners are on page 18 of the Yearbook.

MSCS

Conference Sponsors

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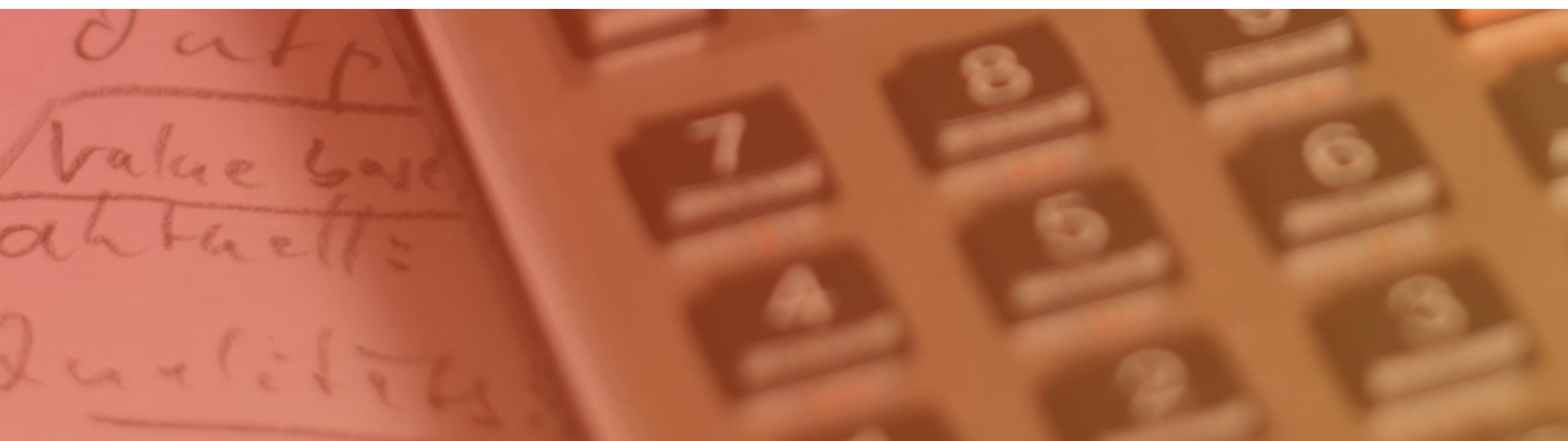
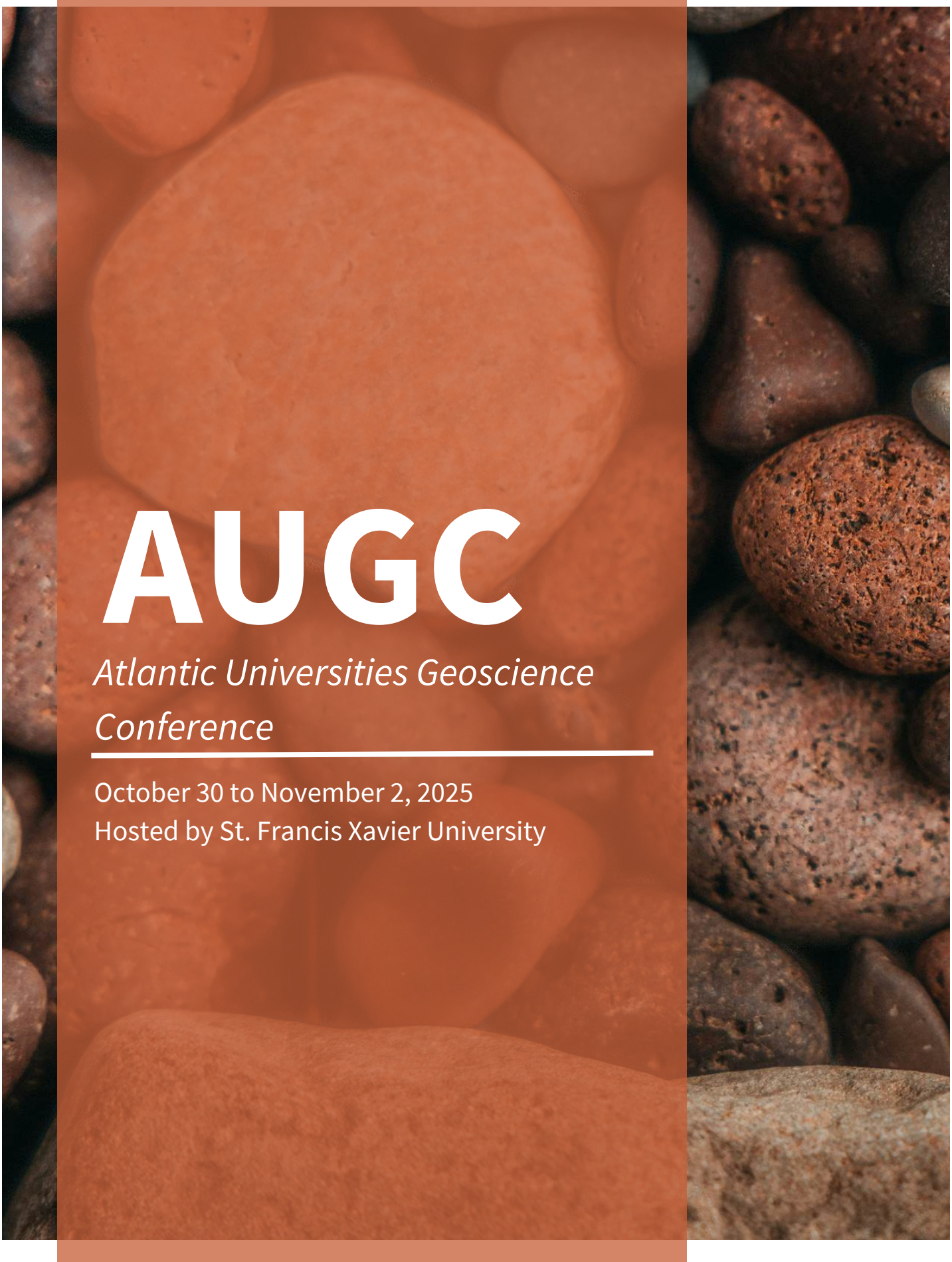
AARMS
Atlantic Association for Research in the Mathematical Sciences

Cape Breton University

CBU School of Science and Technology





AUGC

Atlantic Universities Geoscience Conference

October 30 to November 2, 2025
Hosted by St. Francis Xavier University

Science Atlantic Best Paper Award

FIRST PLACE

Kayla Gerard
University of New Brunswick, Fredericton

On the Discovery of a Large *Taenidium* Burrow from the Clifton-Stonehaven Formation in New Brunswick

Kayla Gerard[1], Matthew Stimson[2], Margaret Scott[1], Bailey Malay[2], Adrian F. Park[3], Lynn Dafoe[4]
[1]University of New Brunswick, Fredericton, [2]New Brunswick Museum, [3]New Brunswick Department of Natural Resources and Energy Development, [4]Geological Survey of Canada

Trace fossils from the Clifton Formation have sparsely been reported in literature with only a cameo-appearance of an amphibian track and an invertebrate trackway being reported amidst a detailed description of the sequence stratigraphy of the formation and sedimentary lithofacies. We report the first systematic description of a large *Taenidium* burrow from the Clifton Formation, discovered near the township of Stonehaven. This fossil is notably larger relative to other Carboniferous-aged *Taenidium* burrows in the region; although it is comparable in sizes to other examples of *Taenidium* known elsewhere in the ichnological record. The burrow exhibits a meniscate backfill that is characteristic of the ichnogenus *Taenidium*, but differs with the presence of intraformational grey-colored mudstone intraclasts within the infilling sediment. The matrix sediment which infills the burrow is identical in lithology to the host sediment, making recognition of the burrow difficult. This heterogeneous infill has not been reported in association with *Taenidium* burrows before and does not adhere to known vertebrate taxonomy. The Clifton Formation was deposited under semi-arid conditions, and this paleoenvironment may have contributed to the unique preservation and infill characteristics observed in this burrow. We propose a new ichnospecies within *Taenidium*, expanding its ichnotaxonomic definition to include backfills incorporating lithologically similar intraclasts. This discovery not only adds to the ichnodiversity of the Clifton Formation but also offers new insight into trace maker behavior and sedimentary processes in semi arid Carboniferous environments of Atlantic Canada.

The **Science Atlantic Best Paper Award** is presented to students based on the criteria of the **Science Atlantic Undergraduate Research Award**. More information on this award can be found on page 13 of the Yearbook.

Updates on an Ichnofossil Assemblage from the Mid Pennsylvanian Minto Formation of Central New Brunswick

Luke Allen[1], Rowan Norrad[2], Matthew Stimson[3], Olivia King[4], Steven Hinds[5], Adrian Park[5], Dave Keighley[1], Bailey Malay[3]
[1]University of New Brunswick, Fredericton,[2]Acadia University,[3]New Brunswick Museum,[4]Carleton University,[5]New Brunswick Department of Natural Resources and Energy Development

A prolific fossil locality situated along the southern shoreline of Grand Lake has continued to yield a diverse array of plant fossils, tetrapod and invertebrate footprints and invertebrate body fossils from the mid-Pennsylvanian aged Minto Formation of central New Brunswick. The tetrapod ichnofossils are represented by six ichnogenera that tentatively include: *Batrachichnus salamandriodes*, *Characichnos*., *Limnopus sp*., *Matthewichnus sp*., *Notalacerta sp*., cf. *Psuedobradypus sp*. Trackways provide ichnological evidence as a proxy for biodiversity of terrestrial amphibians (temnospondyls, microsaurs, stem tetrapods, anthracosaurs) and early amniotes (reptiles and/or synapsids). Tetrapod footprints are preserved alongside an equally diverse invertebrate ichnofaunal assemblage (7 ichnogenera). In the proximal floodplain grey shales, millimeter-scale surface traces (*Gordia sp*., *Helminthoidichnites sp*., *Helminthopsis sp*.) are found in association with small land snails (*Dendropupa sp*.). Small (2cm wide) examples of myriapod tracks (*Diplichnites cuthiensis*) are commonly preserved in the distal floodplain redbed shale facies alongside rare examples of scorpion tracks (*Stiaria sp*.). Rare xiphosuran trackways (*Kouphichnium sp*.) are interpreted as evidence of a distal open water connection, perhaps in back-barrier wetland environments as was previously interpreted from the petrography of Minto coal beds. Planolites traces are found associated with tetrapod tracks in sandstone lithofacies. Rare blattoid (cockroach: *Archimylacris sp*.) and Odonata (dragonfly-like: *Brunellopteron norradi* and cf. *Meganura sp*.) wings represent flying insect fauna in the Minto Formation. Cumulatively, these ichnofossils and invertebrate body fossils help to futher populate the limited biodiversity of the Minto Formation.

HONOURABLE MENTION

Luke Allen
University of New Brunswick, Fredericton

Imperial Oil Best Poster Award

FIRST PLACE

Lauren DiPietro

Dalhousie University

Chlorite Compositions, Prograde Metamorphism, and Gold-Related Trace Elements

Lauren DiPietro[1], *Richard Cox*[1]

[1] *Dalhousie University*

This project will focus on volatile-metalloid (VM) element (S, Se, Te, Sb, Bi, Hg, As, etc) behavior during progressive metamorphism of pelitic rocks from the West Highlands of Scotalnd. The metamorphism is represented by chlorite-mica schists to garnet-muscovite schists, with at least two stages of deformation and variable retrograde reactions present. VM-elements are commonly related to orogenic gold mobilization, and the compositions of sheet silicates have been used as indicators of gold deposition. In polymetamorphic terranes, different deformation events may be responsible for the reactions releasing volatile and metalloid elements. Microstructures preserved by sheet silicates are widely used to examine P-T conditions and deformation. This project will investigate P-T conditions and trace-element variations during multistage deformation in samples from the West Highlands which were mapped and collected in May of this year. These include samples from near the gold mine at Cononish Glen, where previous studies link high-Te with high gold concentrations. The research will involve, (i) SEM analysis of chlorite-schists and chlorite-altered retrograde garnets with identification of chlorite growth zoning during varying metamorphic conditions (ii) X-ray mapping and analyses of major elements in the sheet silicates to produce P-T-d maps, and in the future, (iii) trace-element analysis using LA-ICP-MS to determine which deformation event(s) released volatile, gold-related elements, (iv) grades of metamorphism that release the majority of volatile elements.

About the Imperial Oil Best Poster Award

The **Imperial Oil Best Poster Award** is given to the student presenting the best overall student poster on any topic at the annual AUGC. The award is judged primarily on the basis of the scientific quality of the topic, the amount of original work done by the student, and their understanding of the subject.

Imperial Oil Best Poster Award

HONOURABLE MENTION

Ashley Green
Memorial University of Newfoundland

U-Pb Geochronology and Petrography of Alkaline Intrusions from the Rehamna, Central, and Jebilet Massifs, Morocco

Ashley Green[1], *Steven Denyszyn*[1]
[1] *Memorial University of Newfoundland*

Alkaline mafic magmatism is linked with intraplate volcanism and tectonic evolution of continents assembled by terrane accretion. In the Western Meseta terrane of Morocco, there are alkaline igneous rocks that require study to determine the conditions of their formation. Their tectonic setting is possibly arc-related or plume-derived, depending on the magma signatures. To associate such alkaline igneous rocks with a specific igneous process, the geochemistry and ages must be determined. This terrane represents the main orogenic zone linked to Africa's Variscan belt and is regarded as part of the precursor to the Gondwana supercontinent. The rocks of the Western Meseta massifs have uncertain ages, and the tectonic processes that led to their formation are vaguely understood. This study aims to constrain the ages and geochemistry of the Moroccan alkaline igneous rocks of the Western Meseta to understand the petrogenesis of the terrane. Preliminary geochemical analyses have been conducted on most samples; further analysis will help clarify whether an arc-related or plume-derived process caused their formation. Ages of the mafic to intermediate samples are unconstrained; employing techniques with greater precision will lead to a better understanding of the Moroccan samples. U-Pb geochronology, lithogeochemistry, and petrography will be used to collect data at Memorial University of Newfoundland. Thin sections for petrographic analysis are prepared, U-Pb geochronological analysis is performed using Isotope Dilution Thermal Ionization Mass Spectrometry (ID-TIMS), and lithogeochemistry work will involve Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

Frank S. Shea Memorial Award in Economic or Applied Geology

FIRST PLACE

Emily Theben
Dalhousie University

Nickel for Your Thoughts: Decoding Mineral Textures and Assemblages of the Geminid Deposit

Emily Theben[1], Richard Cox[1], James Brenan[1], Mattea McRae[2]
[1]Dalhousie University, [2]Gold Candle Ltd.

Located in northern Ontario 140km southeast of Timmins, the Kerr-Addison Mine was one of Canadas highest producing gold mines - producing over 11M oz of gold between 1938 and 1996. The deposit is located east of the Larder Lake-Cadillac Break within the Archean Abitibi Greenstone Belt, a region characterized by numerous ore deposits. Kerr-Addison was acquired by Gold Candle Ltd in 2015. Exploration drilling has been on-going since 2017, and in 2023, unexpected nickel mineralization was discovered and was named the Geminid Deposit. Since its discovery, the deposit has become a continued focus of exploration. The Ni-mineralization occurs within ultramafic and clastic facies of the Larder Lake Group and is dominated by millerite, a pure Ni sulphide mineral. This research will provide an initial characterization of the deposit, addressing limited prior research on the Ni-mineralization. The study will focus on magmatic and secondary sulphide mineral textures and phases, investigating their relationship to Ni distribution. This will be completed using: (1) Detailed petrographic analysis of the magmatic and secondary minerals present, (2) X-ray mapping to determine phase distributions, (3) Analysis of major and minor elements, including Ni, Co, Cu, etc, using EMPA, and (4) LA-ICP-MS analysis to both map the distribution of minor and trace-elements and determine the maximum and minimum trace-elements contents. This will allow the determination of a mass-balance for Ni and other related elements. The results will be used to propose a model for the genesis of this Ni-deposit, providing a basis for future investigation.

About Frank Shea

Frank Shea spent over 27 years in mineral exploration and development in Atlantic Canada, including more than a decade as Chief Geologist and Director of the Mineral Resources and Geological Services Division with the NS Department of Mines. A graduate of both St. Francis Xavier and Dalhousie universities, he was deeply committed to geology education. The Mining Society of Nova Scotia is proud to sponsor this award in his honour.

Frank S. Shea Memorial Award in Economic or Applied Geology

HONOURABLE MENTION

Laura Riendeau
St. Francis Xavier University

Exploring the Influence of Rock Geochemistry on Biofilm Composition in a Lithium Pegmatite System Using Metabarcoding

Laura Riendeau[1], *Donnelly Archibald*[1], *Jesse McNichol*[1]
[1] *St. Francis Xavier University*

Microbes inhabit almost every environment on Earth and their community compositions are highly dependent on abiotic environmental gradients. These abiotic environments include different rock types that can have very different chemical compositions. The objective of this research is to investigate the influence of rock geochemistry on distributions in microbial communities, with a focus on lithium, a critical mineral that is important for decarbonization. Microbial biodiversity is being investigated using metabarcoding of rock surface biofilms on outcrops in the Hayman Hill area located near St. Stephen, New Brunswick. The study area is located in the St. Croix terrane of Ganderia and the local geology consists of igneous intrusions, including mainly diorite, granodiorite and biotite-muscovite granite, and spodumene pegmatite dykes that intruded metasedimentary rocks. Small (< 2cm diameter and < 0.5cm thick) rock chips were collected from different rock types for 3-domain metabarcoding, a process that generates a total community fingerprint of eukaryotic and prokaryotic rRNA barcodes that can identify organisms down to the species level and determine their relative abundances. Absolute abundances per unit of exposed surface area will be determined by normalizing to 3 internal standards. Preliminary results show a diverse biofilm community of prokaryotic and eukaryotic microbes and success of a novel DNA extraction method from rock chips. Future work will compare the rock surface metabarcodes to whole-rock geochemical data from the same samples. Taken together, this study aims to uncover the relationships between rock type, geochemistry, and microbial community composition on rock surfaces.

Alexis Gauvin
Dalhousie University

Resolving the Impact of North Atlantic Ocean Circulation Structure on Microbial Diversity

Alexis Gauvin[1], *Unyime Umoh*[2], *Todd Ventura*[2]
[1]*Dalhousie University*, [2]*Saint Mary's University*

The destabilization of the Atlantic meridional overturning circulation (AMOC) is one of the most important environmental issues of our time due to its close correlation with extreme weather patterns. The effect of this changing current on the stratification of microbial communities in the North Atlantic is thus far poorly understood. Last summer, the One Ocean Expedition's transatlantic cruise brought together scientists from around the world to measure ocean productivity markers and compare this to satellite data. From this cruise, our group collected a total of 26 surface water and water column filtrate samples from 10 stations along a transect between Iceland and Portugal with the aim of surveying cellular membrane lipids as a proxy for microbial diversity. Lipids were extracted from the filtrate using a modified Bligh-Dyer technique, then measured using ultra high-pressure liquid chromatography coupled to a quadrupole time-of-flight mass spectrometer. Each unique detected lipid class can be correlated to the presence of a specific microorganism type. Data has currently been collected for chlorophyll and its derivative pheophytin, indicators of primary productivity, and for some GDGT lipids indicative of heterotrophic archaea. By comparing the abundance of these lipid groups, we hope to create a snapshot of how microbial communities are stratified along various points in the transect. In the future, the lipidomic dataset created by this project will be compared to other geochemical and geophysical data (e.x: nitrate, ammonia, TOC concentration, remote sensing) to further resolve circulation conditions in the North Atlantic Ocean.

About the Atlantic Geoscience Society (AGS) Environmental Geoscience Award

The **AGS Environmental Geoscience Award** was established in 2015 by the Atlantic Geoscience Society to recognize the best project (talk or poster) at the annual AUGC involving a significant component of environmental geoscience.

Canadian Energy Geoscience Association Award

FIRST PLACE

Emma Petersen
Memorial University of Newfoundland

The Physiochemical Drivers of Carbonate Precipitation, Transformations and Morphology at Serpentinite-hosted Springs

Emma Petersen[1], *Penny Morrill*[1], *Hilary Corlett*[1]
[1]*Memorial University of Newfoundland*

In order to meet global CO_2 reduction targets, the Intergovernmental Panel on Climate Change states other CO_2 mitigation methods are required. One method is carbon sequestration. This conservation method relies on the research and understanding of how carbonate precipitates, and the stability of carbonate phases for long term storage and sequestration. This study examines the correlations between carbonate precipitate chemistry and the corresponding aqueous geochemistry from three different serpentinite-hosted springs. The Cedars, California, Blow Me Down Massif (BMD), and The Tablelands, Newfoundland. Previously, water data has been reported for The Cedars, and solid carbonate samples were collected for future analysis. In August 2025, I conducted field work at BMD, resulting in data collection from one spring with 7 stations. We collected solids, precipitates, and water samples from the spring and tested the water's pH, Conductivity, Eh, and Total Dissolved Solids. To study this, various methods determining the mineralogy and chemistry of each site will be conducted. For the solid samples, I will use the scanning electron microscope, stable isotopes ($\delta^{13}C$ and $\delta^{18}O$), Fourier Transform Infrared Spectroscopy, and Inductively Coupled Plasma Mass Spectrometry. To analyze water samples, dissolved elements, δD and $\delta^{18}O$ of H_2O, alkalinity, Total Inorganic Carbon concentrations and $\delta^{13}C$ will be completed. Preliminary results show a fairly consistent pH of 9.28-9.92, and varying alkalinity results for BMD samples. Ongoing analysis in comparison with upcoming results of solid carbonates will be conducted to determine the relationships of aqueous geochemistry and carbonate morphology and mineralogy at each location.

About the Canadian Energy Geoscience Association (CEGA) Award

The **CEGA Award** is awarded annually for the best presentation of a petroleum geology-related paper at the annual AUGC.

HONOURABLE MENTION

Brook Penner
Acadia University

Depth Effect on Metamorphic Decarbonation: Insights From Petrography and Mass Balance Constraints in the Sierra Nevada Continental Arc

Brook Penner[1], *Zhenhao Zhou*[1]
[1] *Acadia University*

Earth's climate has alternated between greenhouse and icehouse periods throughout geologic history. In addition to existing carbon sources such as volcanic eruptions, recent studies proposed that metamorphic decarbonation may be another carbon source in the global carbon cycle, especially during the Cretaceous. The evidence for this proposal is the temporal coincidence between the longest continental arcs in Earth's history and the widespread carbonate platforms. Arc magma reacting with pre-existing carbonate rocks releases CO_2 and leads to the formation of metacarbonate rocks (i.e., calc-silicate mineral assemblages). Most previous studies assumed the magma inevitably reacts with carbonate rocks regardless of depth, whereas field-based studies only focused on decarbonation in shallow arcs (< 2 kbar). Therefore, I propose to investigate how depth affects decarbonation behavior. I will focus on metacarbonate rocks within the Sierra Nevada Batholith in California, USA, where arc magma intruded carbonate platforms at varying depths potentially causing metamorphism at a gradient of pressures. I hypothesize that the deeper arc experienced less decarbonation than its shallower counterpart, because heat and fluid required for decarbonation reactions to take place are likely not feasible at depths. I will test this hypothesis by comparing the magnitude of carbon loss from the calc-silicate rocks formed at shallow depths with that formed deeper. This project will provide new field-based constraints on the depth effect on the behavior of metamorphic decarbonation and add additional insights into how metamorphic decarbonation might contribute to the global carbon cycle.

Canadian Society of Exploration Geophysicists Award

FIRST PLACE

Émilie Snow
Acadia University

A Geomorphological Analysis of Coastal Change in Port Joli, NS. Using Remote Sensing and GIS Methods

Émilie Snow[1], *Peter Ricketts*[1]
[1]*Acadia University*

For Nova Scotians, coastal and environmental change has become a topic of increasing concern in recent years. In a province where the majority of the population lives on or near the coast, many residents have expressed a desire for the development of new coastal regulations and policies in response to changing environmental conditions and accelerated sea-level rise. This thesis investigates coastal change at three beaches in Port Joli, a site with a large recreational and residential use, in addition to a having a high cultural significance to the Mi'kmaq communities of Nova Scotia. Remote sensing methods such as historical air photos, drone photogrammetry and LiDAR, in conjunction with GIS methods were used to analyze the remote sensing data. This thesis aims to characterize the geomorphological features and processes of the site. The goal is to improve the understanding of how the system has changed over time thereby further informing future management efforts.

About the Canadian Canadian Society of Exploration Geophysicists (CSEG) Award

Established in 2008, the **CSEG Award** is given to the student who presents the best overall geophysics paper at the AUGC conference. Students are evaluated on the scientific merit of their work, their general understanding of the material covered, and their ability to effectively communicate this to the judges.

HONOURABLE MENTION

Shannon Hegger
University of New Brunswick, Fredericton

Characterizing the Geomorphology and Dynamics of Potential Rock Glaciers in Parc National de la Gaspésie Using LiDAR and Thermal Imaging

Shannon Hegger[1], *Kynan Hughson*[1], *Gilles Ngoran*[1]
[1] *University of New Brunswick, Fredericton*

Three potential rock glaciers were visited in Parc National de la Gaspésie in summer of 2025, with the goal of contributing to the understanding of permafrost and periglacial processes in Eastern Canada. The presence of rock glaciers, along side their structures and activity, in eastern Canada has been fairly under documented and under characterized in recent decades. With the recent rise of global temperatures it is more important than ever to study these features and document their climate sensitivity. Remote sensing surveys were conducted with a small remotely piloted aircraft to collect photogrammetry, LiDAR, and thermal infrared data to produce high-resolution terrain models and multispectral orthophotos. These data were used in the following ways: high resolution imaging (orthophotos), mapping surface temperature anomalies (thermal imaging), identifying and mapping geomorphic facies (LiDAR), and examining internal reflectors, such as ice-rich zones (GPR). The analysis conducted thus far includes mapping of geomorphological features based on orthophotos and LiDAR data and inferring chronostratigraphy. Additionally, early stages of cross-referencing LiDAR data to thermal imaging in the analysis of these rock glaciers in order to look for cold anomalies, implying near surface ground ice.

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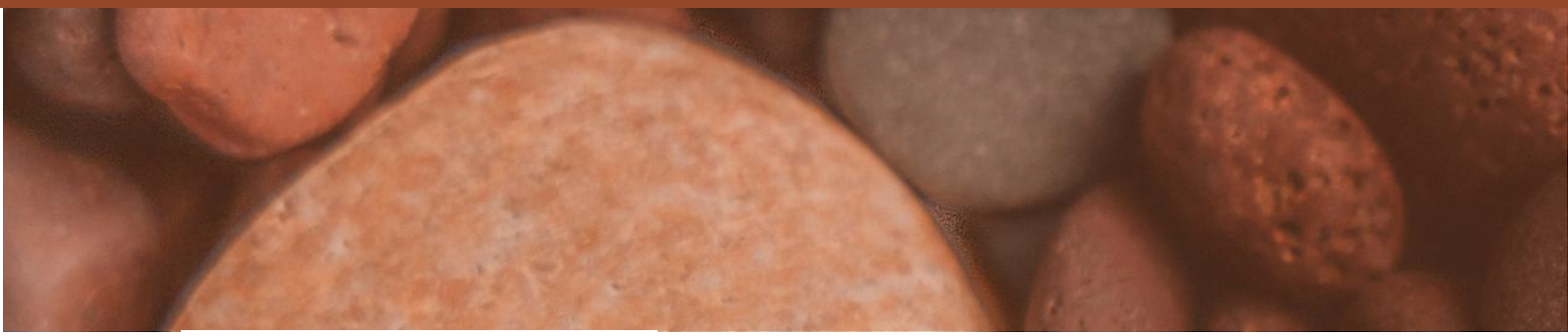

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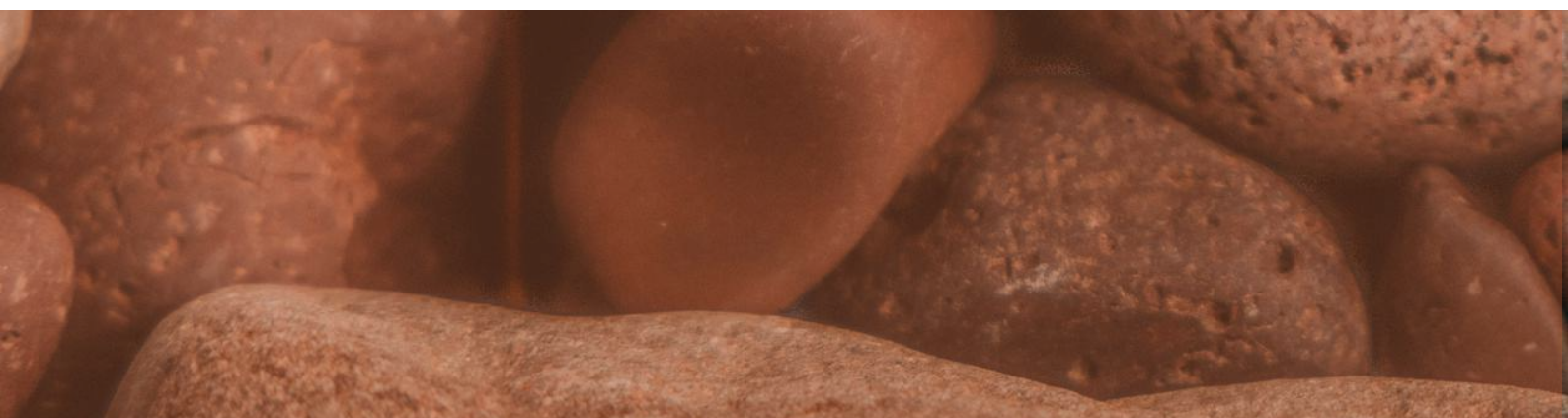
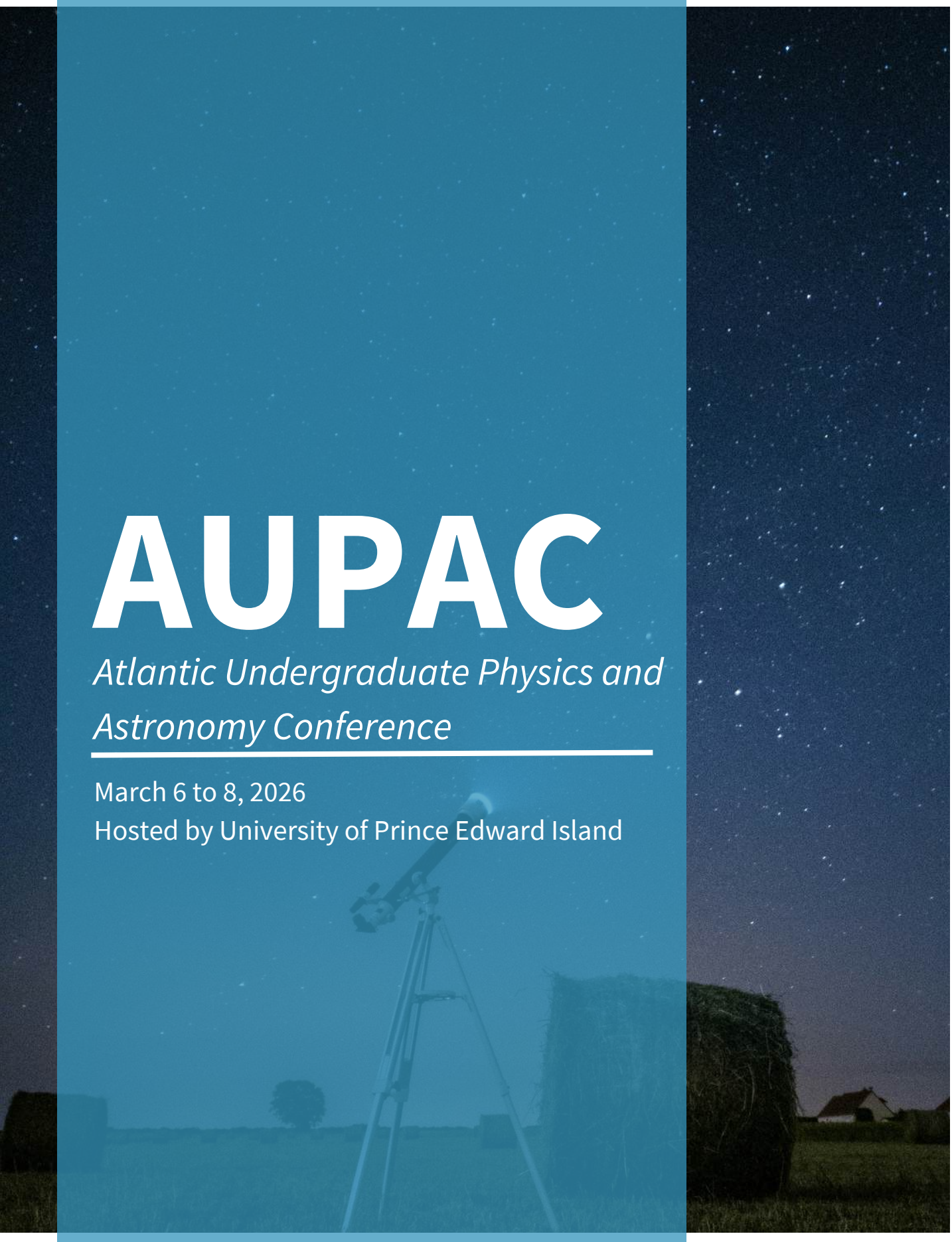




AUPAC

Atlantic Undergraduate Physics and Astronomy Conference

March 6 to 8, 2026

Hosted by University of Prince Edward Island

The Tindall/Steinitz Award in Research

FIRST PLACE

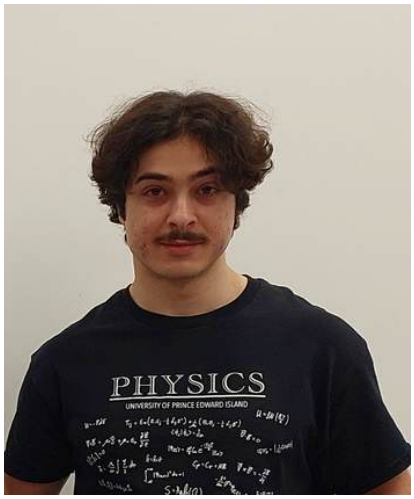
Annika Kienast
Dalhousie University

Strained Transition Metal Dichalcogenide Monolayers

Annika Kienast[1], *Jasleen Jagde*[1], *Grant Wilbur*[1], *Laurent Kreplak*[1], *Kimberley Hall*[1]
[1] *Dalhousie University*

Transition-metal dichalcogenide (TMDC) monolayers have been recognized as suitable materials for quantum technologies due to their unique optical and electronic properties. TMDC monolayers are two-dimensional semiconductor materials consisting of a transition metal atom covalently bonded with two chalcogen atoms. While bulk samples of TMDCs are indirect bandgap semiconductors, their monolayers possess a direct bandgap. Direct bandgaps allow for efficient absorption and emission of light, which is necessary for optoelectronic devices. Strain fields can be applied to TMDC monolayers to create quantum emitters, which are nanoscale devices that confine excitons, enabling the controlled emission of single photons. TMDC monolayers can either be indented by the sharp tip of an atomic force microscope (AFM) or deposited onto pillared substrates to induce the localized strain necessary to decrease the bandgap of the monolayers and form quantum emitters. We have fabricated tungsten diselenide (WSe_2) monolayers by mechanical exfoliation, employing a similar method as that which is used to create graphene. One potential WSe_2 monolayer has been indented using an AFM to create strain-localized single-photon emission centers, while others WSe_2 monolayers have been strained by pillars. Photoluminescence spectroscopy will be used to identify single photon emitters in the strained WSe_2 monolayers. TMDC monolayers are one of the solid-state quantum emitter systems which are studied at Dalhousie's lab in an effort to optimize quantum light sources. Optical pulse shaping of ultrafast lasers can be used to engineer the precise trigger pulses necessary for the quantum emitters formed by straining the TMDC monolayers to become ideal single photon sources. These devices lay the foundation for many areas of quantum information such as distributed quantum networks and quantum key distribution.

The Tindall/Steinitz Award in Research



FIRST PLACE

Behzad Seyyedi Viand
University of Prince Edward Island

Monte Carlo Study of Confinement-Induced Polymer Organization in an Elliptical Cavity

Behzad Seyyedi Viand[1], *James Polson*[1]
[1] *University of Prince Edward Island*

Plasmids are small circular DNA molecules that replicate independently of chromosomal DNA in bacterial cells. Understanding the organizational behaviour of plasmids within confined cellular environments has posed a significant challenge for a long time. However, recent advancements in nanofluidic technology have enabled experiments to be conducted to better understand the physical properties of such systems. Of special note is the experimental research conducted by the Reisner group at McGill University. In one project, their work focused on observing the equilibrium arrangement and dynamics of a solitary DNA strand confined within an elliptical nanofluidic chamber alongside smaller plasmid DNA molecules as a minimal model for a bacterial cell. Their experiments revealed preferential polar localization of the plasmids, an effect that was strengthened by the presence of T4 DNA and by increasing the plasmid population. In this research, we use Monte Carlo simulations of semiflexible coarse-grained polymers to model this experimental system. The polymers are confined to an elliptically capped rectangular cavity bounded above and below by planar walls. A semiflexible polymer and one or more ring polymers are used to represent the linear DNA and plasmids, respectively. The polymers are modeled as hard-sphere chains, and all relevant length-scale ratios in the model, including cavity dimensions, polymer contour lengths, and persistence lengths, are chosen to accurately reproduce the experimental system. We examine the effects of confinement geometry and ring polymer number on the spatial organization of ring polymers. We find that the linear polymer cannot easily occupy the elliptical caps, generating an entropic depletion effect that drives the ring polymers to fill the vacant regions at the poles of the cavity. Our findings are mostly congruent with the experimental results, including the preferential localization of plasmids near the cavity poles. The primary discrepancy is the invariance of the spatial probability distribution of ring polymers as their number is increased. The discrepancy suggests that the hard-sphere model may not fully capture all relevant physical interactions of the DNA molecules under confinement.

The Tindall/Steinitz Award in Research

SECOND PLACE

Mackenzie Hayduk
Saint Mary's University

Orbital Modelling of Fast-Moving Stars in Omega Centauri: New Constraints on the Central Intermediate-Mass Black Hole

Mackenzie Hayduk[1], *Vincent Hénault-Brunet*[1]
[1] *Saint Mary's University*

Intermediate-mass black holes (IMBHs), with masses between 10^2 and 10^5 $M_\odot$, represent a missing link between stellar and supermassive black holes. Characterizing their population is key to understanding the evolution of galactic centres and interpreting future gravitational wave signals detectable with the upcoming Laser Interferometer Space Antenna (LISA). Omega Centauri (ω Cen) is a Milky Way globular cluster and a prime candidate for hosting an intermediate-mass black hole. Recently, Haberle et al. (2024) identified several stars near the cluster center that exceeded the central escape velocity, constraining the IMBH mass to be >8,200 $M_\odot$. In this work, we analyse the central mass by fitting the full orbits of the fast-moving stars using the Octofitter package and all available astrometric data. We find a more stringent lower IMBH mass limit of ~ 5×10^4 $M_\odot$. We further predict orbital parameters and line-of-sight velocities for the fast-moving stars that will refine this analysis when compared with upcoming James Webb Space Telescope data.

About the Tindall/Steinitz Award

The **Tindall/Steinitz Award** is award named after two longstanding members of the Science Atlantic Physics & Astronomy Committee, each who served on the committee over 30 years. This award is is presented to students based on the criteria of the **Science Atlantic Undergraduate Research Award**. Information on the award can be found on page 13 of the Yearbook.

Dr. David Tindall joined Dalhousie University's Physics Department in the early 1970s, where he did research on magnetic phenomena in solids. He is a dedicated teacher and was the department's undergraduate advisor.

Dr. Michael Steinitz has been a physics professor at St. Francis Xavier University since 1973. He cares deeply about students, especially encouraging female students, those from Africa, and those with barriers to learning.

The Tindall/Steinitz Award in Research

SECOND PLACE

Clara Knox
Dalhousie University

Cross-Site Validation of an Open-Source Phantom for a Novel Magnetic Brain Imaging System

Clara Knox[1], *Carson Leslie*[1], *William Gaetz*[2]
[1]*Dalhousie University*, [2]*University of Pennsylvania*

Magnetoencephalography (MEG) non-invasively measures magnetic flux due to brain activity, which can be modelled as temporally varying current segments. Localization error is a key performance metric in MEG, indicating how well the system can localize brain activity. Conventional MEG sensors are superconducting quantum interference devices (SQUIDs). Recently, novel quantum MEG sensors called optically pumped magnetometers (OPMs) have eliminated the need for cryogenic cooling, resulting in new systems with novel sensor configurations. Standardized methods to quantify and compare localization error across these systems are needed. We have developed an open-source device (called a "phantom") with current segments at known positions and orientations. The phantom was validated for assessing localization error on three MEG systems: an OPM system at the design site at the Biosignal Lab (Halifax, NS), plus a SQUID and a second OPM systems at the test site at the Children's Hospital of Philadelphia (USA). We expected localization error to be within 3-5 mm. At both sites, magnetic fields were recorded while each source was driven 100 times at magnitudes similar to human brain activity (50nAm). Field data were averaged at peak activation after noise-reduction processing to isolate the phantom signal. Source localization was completed using recursive least squares fitting to appropriate dipole models for each current configuration. Localization error and systematic bias was determined by comparing measured and known locations across all current segments and repeated measures. For the Biosignal OPM system, localization error was 2.2±1.1mm. No bias exceeded the variability. At the test site, we measured 4.5±1.7mm for the OPM system and 8.1±2.7mm for the SQUID system, with evidence of a 3-to-5-mm bias in one direction. The open-source phantom is approaching performance achieved in recent publications, but some systematic error was noted at the test site. A likely cause is some fabrication and installation error, as the phantom was disassembled and reassembled after travelling to the test site. A new revision is underway to improve the reproducibility of the build. In the long run, an open-source phantom will allow operators worldwide to assess MEG performance on a common platform.

Science Atlantic Science Communication Award

FIRST PLACE

Brycen Thibodeau
Mount Allison University

X-ray Fluorescence Analysis of Infant Formula to Determine Fe, Zn, and K Concentrations

Brycen Thibodeau[1]
[1] *Mount Allison University*

Iron (Fe), zinc (Zn), and potassium (K) are essential micronutrients for infant growth and development, and their concentrations in infant formula must be carefully regulated to ensure nutritional adequacy and safety. In this study, X-ray fluorescence (XRF) spectroscopy was utilized as a rapid, non-destructive method for determining elemental concentrations in commercially available infant formula. Twenty-three powdered infant formula samples were analyzed using XRF, with primary focus on Fe, Zn, and K. Additional elements were examined to provide broader spectral insight. The XRF results were compared to reference concentrations obtained using inductively coupled plasma mass spectrometry (ICP-MS). The ICP-MS results were obtained from a partner lab in Nevada, and were conducted on the same brand of infant formula; however, the original samples were destroyed in the measurement process. The software PyMca was used to generate spectral images of elemental concentrations and to fit analytical curves to the XRF data to obtain numerical data on the concentration peaks of selected elements. Coefficients of determination (R^2) were calculated to assess agreement between the two techniques. Stronger correlations were observed for iron ($R^2 = 0.72$), while the data obtained for zinc and potassium provided coefficients of determination of $R^2 = 0.47$ and $R^2 = 0.25$, respectively. Use of total area ratios (TAR) improved agreement for iron ($R^2 = 0.78$) and zinc ($R^2 = 0.39$), though potassium correlation decreased ($R^2 = 0.19$). A Bland-Altman plot was utilized to assess the agreement between the measured XRF results and the ICP-MS results by plotting their differences against their averages. Results indicated a concentration-dependent bias, with XRF overestimating higher elemental concentrations and underestimating lower concentrations. These results suggest that XRF shows promise as a screening tool for elemental analysis of infant formula, particularly for iron, but further calibration is required for accurate quantification of potassium and zinc.

Science Atlantic Science Communication Award

HONOURABLE MENTION

Carlos Emilio Padilla Robles
University of Prince Edward Island

Elastic Properties of Semiflexible Polycatenane Chains: A Simulation Study

Carlos Emilio Padilla Robles[1]
[1] *University of Prince Edward Island*

Catenanes are assemblies of two or more molecular rings held together by mechanical interlocking rather than conventional covalent bonding. One fascinating catenane found in nature is the kinetoplast, a chain-mail-like structure composed of circular DNA rings, present in the mitochondria of certain trypanosome parasites. Another example is a polycatenane, an extended linear catenane structure analogous to a polymer in which interlocking molecular rings constitute monomeric units. Recently, advances in chemical synthesis techniques have enabled the design and construction of polycatenanes, whose unique physical properties are imparted by topological bonds and can be characterized experimentally using methods such as optical trapping. In this study, Monte Carlo simulations were used to investigate the effects of variable flexibility of the constituent rings of a polycatenane model, under conditions simulating angular optical trap experiments. In particular, a polycatenane chain is both stretched and twisted when a force and a torque are applied to the end rings. A key observation is that a maximum extension was observed for chains with intermediate flexibility, suggesting an optimal rigidity range for mechanical response. Another notable observation is that the angle characterizing the degree of chain twist initially increases linearly with the applied torque, but then undergoes an abrupt, rapid increase over a short range of torque, qualitatively comparable to a phase transition. Long equilibrium times and a pronounced peak in the variance of the twist angle are observed throughout this sudden increase. A useful quantity to help characterize the conformational properties of the chain is the gyration tensor. Here, we use the eigenvalues of this second-rank tensor to calculate scalar shape descriptors such as asphericity and prolateness to monitor the changes in the size and shape of the rings in response to the applied force and torque. Similar to the twist angle, sharp transitions in these quantities are observed, accompanied by pronounced peaks in their variance. In future work, we hope to develop a theoretical model to account for this fascinating phase-transition-like behaviour. We hope that experiments using single-molecule force spectroscopy methods will eventually be applied to study polycatenane to test the predictions of our simulations.

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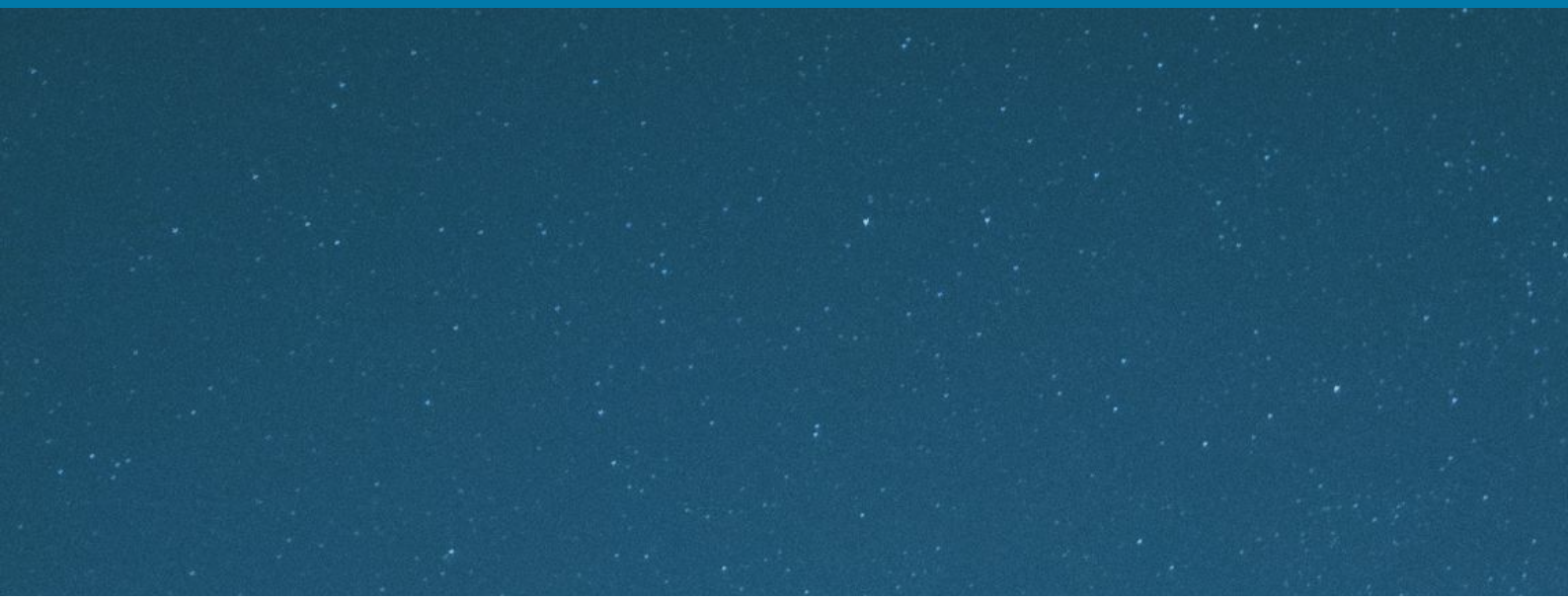

UNIVERSITY of Prince Edward ISLAND

BAAS

Biology and Applied Aquatic Sciences Conference

March 6 to 8, 2026

Hosted by Mount Allison University

Science Atlantic Undergraduate Research Award

FIRST PLACE

Isabel Casey
Mount Allison University

Is It Too Hot to Handle? Do Cardiac Mitochondria Affect the Upper Thermal Limits of Brook Trout?

Isabel Casey[1], *Andrea Morash*[1]
[1] *Mount Allison University*

Aquatic ectotherms, such as brook trout (*Salvelinus fontinalis*), are pushed to their thermal extremes by global warming. Higher temperatures increase metabolic rates, raising mitochondrial oxygen demand for ATP production. Yet, oxygen availability to tissues falls as animals approach their thermal limits. Oxygen delivery depends on the heart, which becomes less efficient at thermal extremes, partly due to mitochondrial breakdown. However, it is unknown how the thermal limits of cardiac mitochondria affect the thermal limits of the whole animal, or if this is affected by acclimation to warmer waters. Therefore, the whole animal, cardiac, and mitochondrial thermal limits were measured in *S. fontinalis* acclimated to either a 16-21°C or 19-24°C thermal cycle. There were no differences found between acclimation groups in critical thermal maxima (CTmax; ~30°C for both treatments) despite the warmer acclimation group having a higher resting metabolic rate and a lower aerobic scope. The temperature at which the heart reached arrhythmia (TArr) was 25.9°C in the warm acclimation group and was not different from the cooler acclimation group (24.2°C). However, this temperature is ~5°C lower than the CTmax, suggesting it may contribute to limiting thermal tolerance. Mitochondrial function was similar between treatments, and the temperature at which mitochondrial function begins to fail (TMF) was ~ 30°C in both treatments. As this temperature is above the TArr, it is unlikely that the mitochondria are contributing to the development of arrhythmia or limiting thermal tolerance in this species.

Information on the **Science Atlantic Undergraduate Research Award** and the **Science Atlantic Science Communication Award** can be found on page 13 of the Yearbook.

SECOND PLACE

Elise Poirier
Dalhousie University

Assessing Genetic and Environmental Drivers of MSX Resistance in Eastern Oysters (*Crassostrea virginica*) in Cape Breton, Nova Scotia

Elise Poirier[1], Ramon Filgueira[1], Rod Beresford[2], Tiago S. Hori , Eric H. Ignatz[1]
[1]Dalhousie University, [2]Cape Breton University, [3]Atlantic Aqua Farms

Eastern oysters (*Crassostrea virginica*) are benthic filter feeders that provide socioeconomic value to coastal communities. However, the spread of *Haplosporidium nelsoni*, the causative agent of Multinucleate Sphere Unknown X (MSX), threatens both wild and farmed oyster populations in the Maritimes. MSX was first detected in Cape Breton's Bras d'Or Lake in 2002 and subsequently detected in Prince Edward Island and New Brunswick in 2024. Currently, no treatment exists to control or eliminate the disease, and resistance through selective breeding remains the most promising management strategy. This project investigated oysters from MacDonald's Pond (MP), NS, where MSX prevalence without disease-associated mortality has been documented for over a decade. To test whether this unique survival is due to genetic resistance or environmental factors, 360 oysters from MP were transplanted to Nyanza Bay (NB), NS, a site with a history of MSX-induced mortality. A control group of 120 oysters remained in MP. Mortality, growth, MSX prevalence, and environmental conditions were monitored throughout the summer of 2025. MSX prevalence decreased in MP, potentially due to local environmental conditions, but remained high at NB. Despite the high prevalence in NB, survival probability in both locations remained above 90%, with no statistically significant differences (p-value = 0.6). These results suggest that oysters from MP could potentially be MSX-resistant or tolerant. A subsequent transplant is ongoing with oysters from multiple locations to corroborate these findings, which could confirm MP oysters as potential candidates for selective breeding programs and support sustainable oyster aquaculture amid rising disease threats.

Science Atlantic Undergraduate Research Award

THIRD PLACE

Nelene Silva
Dalhousie University

Is the Sponge Loop Present at the Makkovik Hanging Gardens?

Nelene Silva[1]
[1] *Dalhousie University*

Deep-sea coral and sponge communities are biodiversity hotspots in nutrient-limited oceans. These taxa sequester nutrients that support higher trophic levels and form complex 3D structures that increase habitat complexity. Food sources in these communities are often thought to derive from surface primary productivity as Particulate Organic Matter (POM). A clearer understanding of these nutrient pathways is needed as climate-driven shifts in phytoplankton communities and surface primary productivity pose poorly constrained threats to deep-sea habitats. Dissolved Organic Matter (DOM) represents a large, relatively stable reservoir of organic carbon. Although largely inaccessible to most metazoans, laboratory feeding experiments suggest sponges can consume DOM and transfer nutrients to higher trophic levels (ie, the sponge loop). The goal of this project was to establish in situ evidence of the sponge loop at the Makkovik Hanging Gardens, a deep-sea vertical-wall habitat ~30 km off the coast of Labrador in Nunatsiavut. Based on remotely-operated-vehicle (ROV) footage, sea stars appear to predate on spong. This hypothesis was tested using nearest-neighbour analysis of orthomosaic images, which revealed a statistically significant relationship between sea stars and sponges. Compound-specific isotope analysis of amino acids demonstrated a strong isotopic affinity between the two taxa. These two lines of evidence strongly support in situ evidence of the sponge loop at the Makkovik Hanging Gardens. These results support Nunatsiavut's marine planning efforts by identifying ecologically and culturally significant environments and contribute to Canada's commitment to conserve 30% of marine habitats by 2030.

Best Graduate Presentation Award

FIRST PLACE

Jordyn Williams
Mount Allison University

Movement and Spatial Ecology of Eastern Painted Turtles and Snapping Turtles in the Jemseg Grand Lake Watershed

Jordyn Williams[1], *Julia Riley*[1]
[1] *Mount Allison University*

Spatial ecology is the study of how animals move through and use the landscape they inhabit. This aspect of an animal's ecology is important to understand, especially for the purposes of conservation as one of the current biggest threats to wildlife and biodiversity is the reduction of habitat. It is critical to understand the habitat needs of wildlife to protect those that promote their survival. My research objective is to describe the movement and spatial ecology of two species-at-risk: the Eastern Painted Turtle (*Chrysemys picta picta*) and Snapping Turtle (*Chelydra serpentina*) in the Jemseg Grand Lake watershed of New Brunswick. This is the first study on these species' habitat use regionally, which will give us insight into what the priority habitats are for these species in the province. In the first year of this study, 11 Snapping Turtles and 13 Painted Turtles were radio-tracked across 5 waterbodies with an approximately even selection of males and females for both species. These turtles were tracked about every 3 days from May to October using radio-telemetry. Each time a turtle was located, environmental and behavioural data were collected to describe habitat use. This data on the spatial ecology of these species will be summarized into daily distance moved and home range size, which will be presented and interpreted. Overall, understanding the space use data of both these species will identify the habitats that are required for their persistence regionally.

Best Graduate Presentation Award

SECOND PLACE

Aleasha David
Université Sainte-Anne

Environmental Drivers of *Anophryoides haemophila* Proliferation: Implications for Managing Bumper Car Disease in Lobster Impoundments

Aleasha David[1], *Dan Lane*[1], *Michelle Theriault*[1], *Jordan Park*[1]
[1] *Université Sainte-Anne*

Bumper car disease, caused by the parasitic ciliate *Anophryoides haemophila*, is a challenge in lobster impoundments and can result in substantial stock losses. Outbreaks reduce product quality, increase holding costs, and create economic uncertainty for harvesters and processors. Identifying environmental conditions that limit parasite proliferation is therefore critical for developing practical mitigation strategies within commercial facilities. This study evaluated how temperature and salinity exposure influence parasite population growth over a 12-day period under controlled laboratory conditions. Population density was monitored through time and compared among treatments to identify environmental thresholds relevant to industry settings. Temperature significantly affected growth, demonstrating strong thermal sensitivity and suggesting that temperature management may influence infection risk. Salinity did not significantly alter growth within tolerable ranges; however, extreme low salinities (0, 5, and 10 ppt) resulted in 100% mortality, indicating potential lower tolerance limits that could inform control strategies. Together, these findings identify temperature as a key environmental driver of parasite expansion and provide industry-relevant insight into environmental manipulation as a potential tool for reducing disease risk in lobster impoundments.

Hannah Hayes
Acadia University

Ammonia Excretory Potential of the Jonah crab (*Cancer borealis*) During Acute Exposure to High Environmental Ammonia

Hannah Hayes[1], *Garett Allen*[1]
[1]*Acadia University*

Ammonia is an acutely toxic metabolic end-product of amino acid catabolism whose accumulation challenges cellular acid-base balance and neuronal function. Ammonotelic animals like brachyuran crabs continuously excrete ammonia into their environment to prevent the accumulation of ammonia through the diffusive movement of gaseous NH_3 and active ATP-dependent transport of ionic NH_4^+ across their gills. The capacity to use ion-transport mechanisms to actively excrete NH_4^+ has primarily been understood through studies of osmoregulatory-capable euryhaline crabs like Carcinus maenas, though most brachyuran crustaceans are marine stenohaline osmoconformers like the Jonah crab Cancer borealis that possess a lesser capacity to alter the ion-transport machinery within their gill epithelium. Isolated perfused gills of Jonah crabs were capable of actively excreting NH_4^+ when acutely exposed to intermediate (150 µmol l^{-1}) and high (500 µmol l^{-1}) environmental ammonia at rates of 7.80 ± 0.82 and 3.01 ± 0.98 µmol g^{-1} h^{-1}, respectively. Despite this capacity, intact animals accumulated ammonia upon acute exposure to intermediate and high environmental ammonia, equating to rates of -0.104 ± 0.03 and -0.408 ± 0.10 µmol g^{-1} h^{-1}, respectively. Following 3-hours of exposure to high ammonia, crabs gradually but variably reduced the rate ammonia accumulated within their hemolymph to 0.125 ± 0.18 µmol g^{-1} h^{-1}, coinciding with a 41% increase in hemolymph ammonia concentrations from 245.8 ± 13.4 to 345.7 ± 17.7 µmol l^{-1}. Heightened hemolymph ammonia concentrations did not establish a favourable diffusion gradient, indicating that enhanced active transport rather than reduced rates of passive NH_3 diffusion likely underlies short-term acclimation.

People's Choice Award (Oral)

Jordyn Williams
Mount Allison University

Movement and Spatial Ecology of Eastern Painted Turtles and Snapping Turtles in the Jemseg Grand Lake Watershed

Jordyn Williams[1], *Julia Riley*[1]
[1] *Mount Allison University*

Spatial ecology is the study of how animals move through and use the landscape they inhabit. This aspect of an animal's ecology is important to understand, especially for the purposes of conservation as one of the current biggest threats to wildlife and biodiversity is the reduction of habitat. It is critical to understand the habitat needs of wildlife to protect those that promote their survival. My research objective is to describe the movement and spatial ecology of two species-at-risk: the Eastern Painted Turtle (*Chrysemys picta picta*) and Snapping Turtle (*Chelydra serpentina*) in the Jemseg Grand Lake watershed of New Brunswick. This is the first study on these species' habitat use regionally, which will give us insight into what the priority habitats are for these species in the province. In the first year of this study, 11 Snapping Turtles and 13 Painted Turtles were radio-tracked across 5 waterbodies with an approximately even selection of males and females for both species. These turtles were tracked about every 3 days from May to October using radio-telemetry. Each time a turtle was located, environmental and behavioural data were collected to describe habitat use. This data on the spatial ecology of these species will be summarized into daily distance moved and home range size, which will be presented and interpreted. Overall, understanding the space use data of both these species will identify the habitats that are required for their persistence regionally.

People's Choice Award (Poster)

Hannah Hayes
Acadia University

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Hannah Hayes[1], *Garett Allen*
[1]*Acadia University*

Ammonia is an acutely toxic metabolic end-product of amino acid catabolism whose accumulation challenges cellular acid-base balance and neuronal function. Ammonotelic animals like brachyuran crabs continuously excrete ammonia into their environment to prevent the accumulation of ammonia through the diffusive movement of gaseous NH_3 and active ATP-dependent transport of ionic NH_4^+ across their gills. The capacity to use ion-transport mechanisms to actively excrete NH_4^+ has primarily been understood through studies of osmoregulatory-capable euryhaline crabs like Carcinus maenas, though most brachyuran crustaceans are marine stenohaline osmoconformers like the Jonah crab Cancer borealis that possess a lesser capacity to alter the ion-transport machinery within their gill epithelium. Isolated perfused gills of Jonah crabs were capable of actively excreting NH_4^+ when acutely exposed to intermediate (150 µmol l^{-1}) and high (500 µmol l^{-1}) environmental ammonia at rates of 7.80 ± 0.82 and 3.01 ± 0.98 µmol g^{-1} h^{-1}, respectively. Despite this capacity, intact animals accumulated ammonia upon acute exposure to intermediate and high environmental ammonia, equating to rates of -0.104 ± 0.03 and -0.408 ± 0.10 µmol g^{-1} h^{-1}, respectively. Following 3-hours of exposure to high ammonia, crabs gradually but variably reduced the rate ammonia accumulated within their hemolymph to 0.125 ± 0.18 µmol g^{-1} h^{-1}, coinciding with a 41% increase in hemolymph ammonia concentrations from 245.8 ± 13.4 to 345.7 ± 17.7 µmol l^{-1}. Heightened hemolymph ammonia concentrations did not establish a favourable diffusion gradient, indicating that enhanced active transport rather than reduced rates of passive NH_3 diffusion likely underlies short-term acclimation.

Science Atlantic Undergraduate Research Award

Charlotte Polo
Dalhousie University

Proteins Under Pressure: Investigating Folding Intermediates of the Pyriform Spider Silk Repetitive Domain by High Pressure NMR Spectroscopy

Charlotte Polo[1], *Jan Rainey*[1]
[1] *Dalhousie University*

Spider silks are natural protein-based materials highly lauded for their impressive strength, toughness, and extensibility. A female orb-weaving spider can produce up to seven different silks, each specialized for a specific function and possessing distinct properties. Despite advances in the study of spider silks, knowledge of how spider silk proteins (spidroins) self-assemble into fibres remains limited. Much of the research on spidroin self-assembly has focused on major ampullate silk, leaving the remaining orb-weaver silks largely unexplored in this regard. One such silk is pyriform (or piriform) silk, which is used by spiders to adhere webs to substrates. The spidroin component of this silk, PySp1, from the spider *Argiope argentata* contains a 234-residue repeat unit. A truncated single repeat unit of PySp1, termed N2C2HPy1, has previously been characterized. This research project aims to use high pressure nuclear magnetic resonance spectroscopy to probe for folding intermediates of N2C2HPy1. It is hypothesized that through stabilizing protein conformations of lower partial molar volume, high pressure NMR allows for the observation of partially folded intermediates along the fibre formation pathway. This work aims to provide insight into the conformational changes undergone during the fibre formation process and broaden the current understanding of fibre assembly for recombinant spidroins.

Emily Murphy
Mount Saint Vincent University

Comparing the Thermal Stress Tolerance Plasticity of Invasive Versus Native Species

Emily Murphy[1], *David Neil Awde*[1]
[1] *Mount Saint Vincent University*

Climate change has resulted in overall increases in environmental temperature and an increased frequency of extreme weather events. In these conditions, species that have the ability to respond to thermal variation via physiological plasticity, may be well-suited to expand their endemic geographic ranges and outcompete native species. Therefor, I predict invasive species from warm climates should have a stronger response to acute thermal stress (i.e., thermal hardening) compared to native species from cold climates, which should have a stronger baseline cold tolerance, and rely more on chronic responses to temperature change (i.e., thermal acclimation). My research aims to quantify a potential difference in thermal stress tolerance plasticity between lady beetle species that are invasive and native to North America; *Harmonia axyridis* and *Adalia bipunctata*, respectively. Through experimental testing, I exposed individuals to different thermal environments, then measured their chill coma recovery time (CCRt). Preliminary results indicate that *H. axyridis* can improve CCRt, following prior chronic and acute cold exposure, demonstrating measurable plasticity. However, the duration of pre-exposure does not significantly influence CCRt, suggesting that even brief cold exposure may be sufficient for acute adjustment. Ongoing data collection from *A. bipunctata* individuals should offer a valuable contrast to data from *H. axiridis*. Overall, this comparison will help clarify how invasive and native species differ in thermal stress tolerance plasticity, which can be used to predict the short- and long-term effects of climate change on species interactions.

Science Atlantic Science Communication Award (Poster)

Reem Eissa
Université Sainte-Anne

Occurrence of Antimicrobial Resistance and Virulence Genes in Enterococci from Gulls (*Larus* spp.) at Coastal Fish Processing Plants in Clare, Nova Scotia

Reem Eissa[1], *Micheline Theriault*[1], *Katrine Bourgeois*[1], *Rym Ben Sallem*[1]
[1] *Université Sainte-Anne*

Antimicrobial resistance (AMR), exacerbated by antimicrobial overuse in agriculture and aquaculture, is a global health threat. Seabirds foraging in human-impacted coastal areas are well-positioned to acquire and disseminate AMR. This study aimed to characterize antibiotic-resistant enterococci in the fecal microbiota of seabirds. Enterococci were isolated from 110 fresh fecal samples collected from *Larus* spp. at three fish processing plants along the shorelines of Baie Sainte-Marie. Species identification and antibiotic resistance genes were confirmed by polymerase chain reaction (PCR). Antimicrobial susceptibility was determined using the CLSI disk diffusion method; vancomycin susceptibility was additionally assessed by the CLSI agar dilution method. High-level resistance to aminoglycosides (HLAR) was considered. Among the *Enterococcus* spp., *E. faecalis* and *E. faecium* were predominant: 32 *E.faecalis*, 74 *E.faecium*, 3 *E.hirae*, and 1 *E.durans*. Phenotypic resistance for *E. faecalis* and *E. faecium* was: linezolid (21.8%; 45.5%), ampcillin (4.5%; 21.8%), erythromycin (26.4%; 63.6%), trimethoprim-sulfamethoxazole (11.8%; 22.7%), tetracycline (14.5%; 23.6%), clindamycin (23.6%; 60.9%), ciproflaxin (23.6%; 61.8%), chromaphenicol (19.0%; 30.9%), pristinamycin (21.8%; 40.9%), and vancomycin (10.0%; 6.4%). Of erythromycin-resistant isolates, the *erm(B)* gene was detected in 1.9%. The *tet(M)* gene was found in 39.1% of tetracycline-resistant isolates, and *tet(L)* was found in 34.7%. Of the 80 isolates tested for streptomycin and gentamicin, 9 (11.25%) showed HLAR co-resistance. The distribution of virulence genes is as follows: *cylA* (23.6%), *cylB* (0%), *cylM* (0%), and *gelE* (17.3%). Overall, the presence of AMR and virulence factors in seabird-associated enterococci suggests that coastal wildlife may serve as important sentinels of environmental AMR dissemination.

The Canadian Botanical Association Botany Award (Oral)

Taylor Cahill
Acadia University

Silicic Acid Soil Amendment Impacts Drought Tolerance in Strawberry

Taylor Cahill[1], Zoë Migicovsky[2], Emma Adams[1], Ian Willick[1]
[1]Acadia University,[2]Agriculture and Agri-Food Canada

Strawberries are an economically and nutritionally important fruit crop in Canada. However, their growth and yield can be compromised when under water-limited conditions. Recent research suggests that application of silica to the soil may reduce the effects of drought stress in plants. To test that potential of silica in drought-stressed strawberries, 20 cv. 'Wendy' and 20 cv. 'Valley Sunset' were grown in a controlled growth chamber with set day/night cycle. For each cultivar, half the plants (n = 10) were treated with a 24 mM monosilicic acid solution applied to the soil. Strawberries within the silica-treated and non-treated groups received water to maintain a soil water content of 50-70% to promote optimal irrigation (n = 5) or 20-30% to induce water-limiting stress (n = 5). All plants were evaluated for stomatal length, width and density, leaf relative water content, runner and trifoliate growth. Physiological measurements were collected in the morning and afternoon to determine the effect of soil rehydration, including leaf stomatal conductance, transpiration rate, vapor pressure deficit, water mole fraction, quantum efficiency, electron transport rate, leaf temperature. Data were analyzed using a linear model that accounted for variation due to silica treatment, cultivar, and water treatment across several traits. Silica was found to significantly increase transpiration in the morning and afternoon, increase stomatal conductance in the afternoon, and decrease quantum efficiency in the afternoon. Future work may include examining the root biomass between treatment groups and the silica concentration remaining in the soil.

About the Canadian Botanical Association Botany Award

The Canadian Botanical Association/L'association botanique du Canada Undergraduate Student Regional Awards Program offers an award at the annual undergraduate Biology conferences in each of the five regions of Canada. The purpose of this recognition is to encourage undergraduate students to pursue graduate research in botany.

The Canadian Botanical Association Botany Award (Poster)

Tedi Pollak
Acadia University

Investigating Arctic Louseworts for Mycorrhizal Associations and Parasitism

Tedi Pollak[1], *Sarah Doyle*[1], *Allison Walker*[1], *Zoe Panchen*[1]
[1]*Acadia University*

Louseworts (genus *Pedicularis* L.) are hemi-parasitic flowering plants with Arctic-alpine distribution. Some Arctic species are traditionally harvested and eaten by Inuit. Communities in Nunavut are interested in cultivating louseworts in greenhouses to increase their availability and aid food security. However, louseworts have proven difficult to grow outside their natural environment. Recent studies have found mycorrhizal associations in lousewort species, which we hypothesize may impact their germination and survival. This study examined *Pedicularis langsdorffii* subsp. *arctica* collected from Melville Island, NU, and aimed to answer these questions: 1) what type of mycorrhizal associations and species are present?; 2) what are its parasitic relationships?; 3) which factors influence germination? Roots of *P. langsdorffii* and nearby plants (primarily *Salix arctica*) were examined in the field for associations. *P. langsdorffii* and *S. arctica* roots were stained and examined under a compound microscope for fungal associations. Fungal DNA was extracted from roots and soil, then sequenced to identify species. Germination experiments were conducted to assess germinability with different substrates (Arctic soil, potting soil, filter paper), and treatments (scarification, light, moist chilling, host presence). Arbuscular mycorrhizal fungi and dark septate endophytic fungi were observed in roots of both *P. langsdorffii* and *S. arctica*. Fungal DNA was present in all soil extractions and most root extractions. Haustoria were documented on *S. arctica* roots. Seeds did not germinate in any treatment, even though chemical testing showed approximately 60-80% seed viability. Results suggest *P. langsdorffii* is both parasitic and mycorrhizal, but further research should examine additional factors affecting germination.

Best Poster Award

Ariela Polsky
Dalhousie University

Concomitant Rise of Hypervirulent M1UK and Macrolide-Resistant *Emm*92 Explains Recent Increases in Invasive Group A Streptococci Activity in Nova Scotia

Ariela Polsky[1], Samuel Hatchette[1], Nicole Paterson[1], Gregory McCracken[2], Allana Roder[3], Janice Pettipas[3], Elizabeth Simms[2,4], Alyssa Golden[3], Irene Martin[3], Jason J. LeBlanc[1,2]
[1]Dalhousie University, [2]Nova Scotia Health, [3]Public Health Agency of Canada, [4]Nova Scotia Provincial Public Health Laboratory Network

Background: Invasive group A streptococci (iGAS) infections cause significant morbidity and mortality worldwide. Following the COVID-19 pandemic, increased iGAS activity was associated with the rise of the hypervirulent M1UK strain. However, M1UK only partially explained the increased iGAS activity in Nova Scotia. As macrolide resistance also increased during the post-pandemic period, this study investigated whether antibiotic resistance could also have contributed to the increased iGAS activity.

Methods: Routine susceptibility testing was performed using erythromycin, clindamycin, and tetracycline disks. A D-test was used to assess macrolide efflux (M phenotype) or constitutive/inducible resistance to macrolide/lincosamide/streptogramin B (cMLSB and iMLSB, respectively) from erythromycin ribosomal methylases. Whole genome sequencing was performed on iGAS isolates from 2012 to 2025, and identification efflux (*mef*) or ribosomal methylases (*erm*) genes conferring the M, cMLSB and iMLSB phenotypes.

Results: Macrolide resistance rose from 8.3% in 2012-2019 to 40.4% in 2025. This rise was attributed primarily to *emm*92 harboring a plasmid-borne *ermT*, which was not seen in Nova Scotia prior to 2023. Smaller contributions to iMLSB resistance stemmed from *ermTR* or *ermB*-mediated cMLSB. All iMLSB cases were also tetracycline resistant.

Conclusions: Increased iGAS cases in Nova Scotia were associated with hypervirulent M1UK and a concomitant rise in macrolide-resistant strains like *emm*92. The proportions of *emm*92 were much higher than seen nationally, possibly suggesting clonal expansion or co-selection of resistance macrolide and tetracycline resistance genes. Interestingly, Nova Scotia has the highest rates of doxycycline prescriptions in Canada, likely due to treatment of diseases like Lyme.

Tyler Murphy
University of New Brunswick, Fredericton

Conserved Mechanotransduction Gene Expression in Cavefish Despite Sensory System Adaptations

Tyler Murphy[1], Tamara Franz-Odendaal[2], Timothy Erickson[1]
[1] University of New Brunswick, Fredericton, [2]Mount Saint Vincent University

Sensory systems shape how organisms perceive their environment. The Mexican tetra (*Astyanax mexicanus*), which exists as a surface-dwelling and a cave-dwelling morph, provides a model to examine sensory adaptations. However, it is unclear whether enhanced lateral line sensitivity in the cave morph is associated with changes in the expression of core mechanotransduction genes In zebrafish, ohnologs of the hair cell mechanotransduction gene *lhfpl5* have undergone subfunctionalization, with *lhfpl5a* expressed in the inner ear hair cells and *lhfpl5b* expressed in the neuromast hair cells of the lateral line. This study compares *lhfpl5* ohnolog spatial expression between Mexican tetra and zebrafish. The cave morph provides a model for studying the molecular evolution of sensory systems in an organism with an increased reliance on the lateral line. mRNA in situ hybridization and hybridization chain reaction revealed conserved spatial expression patterns of *lhfpl5a* and *lhfpl5b* between zebrafish and Mexican tetra, as well as between surface and cave morphs. These findings suggest that enhanced mechanosensory sensitivity in cave-dwellers is not associated with changes in spatial expression patterns of core mechanotransduction genes. Future CRISPR-Cas9 assays can build from these findings to confirm functional divergence in the Mexican tetra morphs and study behaviour associated with the lateral line in an enhanced sensory system.

People's Choice Award (Poster)

Emma Bristow
Saint Mary's University

Optimization of Conditions for the Expression of Recombinant NodD in an E. coli-Based System

Emma Bristow[1], *David Chiasson*[1]
[1] *Saint Mary's University*

Legume plants are unique since they are able to obtain their nitrogen from a symbiotic relationship with soil bacteria (rhizobia). Rhizobia can convert atmospheric dinitrogen gas into ammonia through a process called nitrogen fixation. When legume plants are starved of nitrogen they secrete flavonoids, chemical signals that are detected by rhizobia. Perception of flavonoids triggers rhizobia to produce signalling molecules known as a Nodulation (Nod) factors. In turn, the plant perceives the Nod factors which leads to rhizobial infection of root tissue. A central regulator of Nod factor production is Nodulation protein D (NodD). NodD is a transcriptional regulator that binds to the nod box, a region of DNA located upstream of the nod genes. Although NodD was discovered 30 years ago, the mechanism of NodD transcriptional regulation is not fully understood. This study aimed to establish an optimized NodD recombinant protein expression system to provide a pathway to investigate NodD function. We chose to test an Escherichia coli expression system to produce and purify the NodD protein. Testing growth temperatures, solubility partners, and affinity tags identified optimized conditions for NodD expression. Soluble NodD protein was isolated, opening the door to future work to resolve NodD function.

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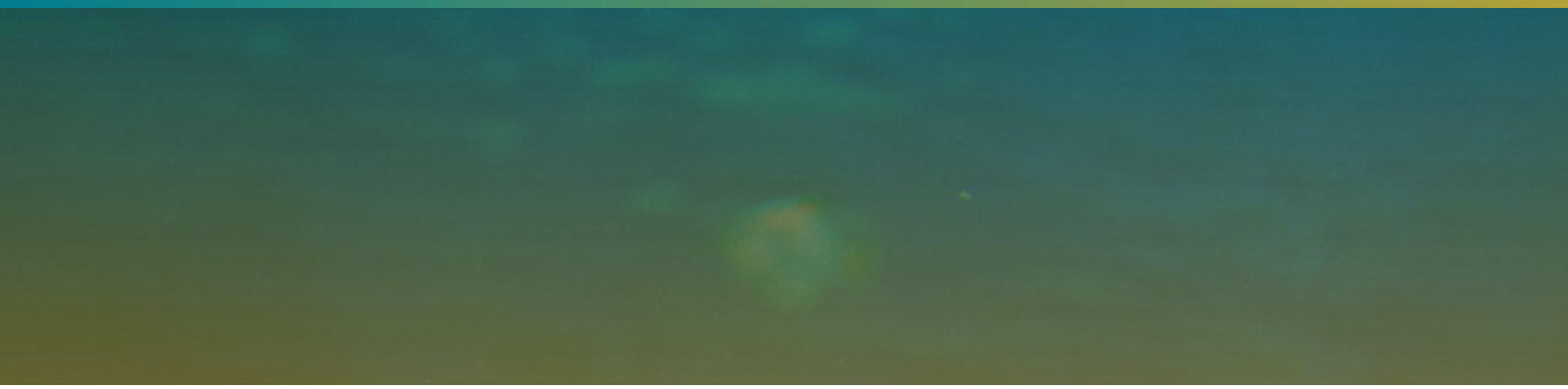

Mount Allison University

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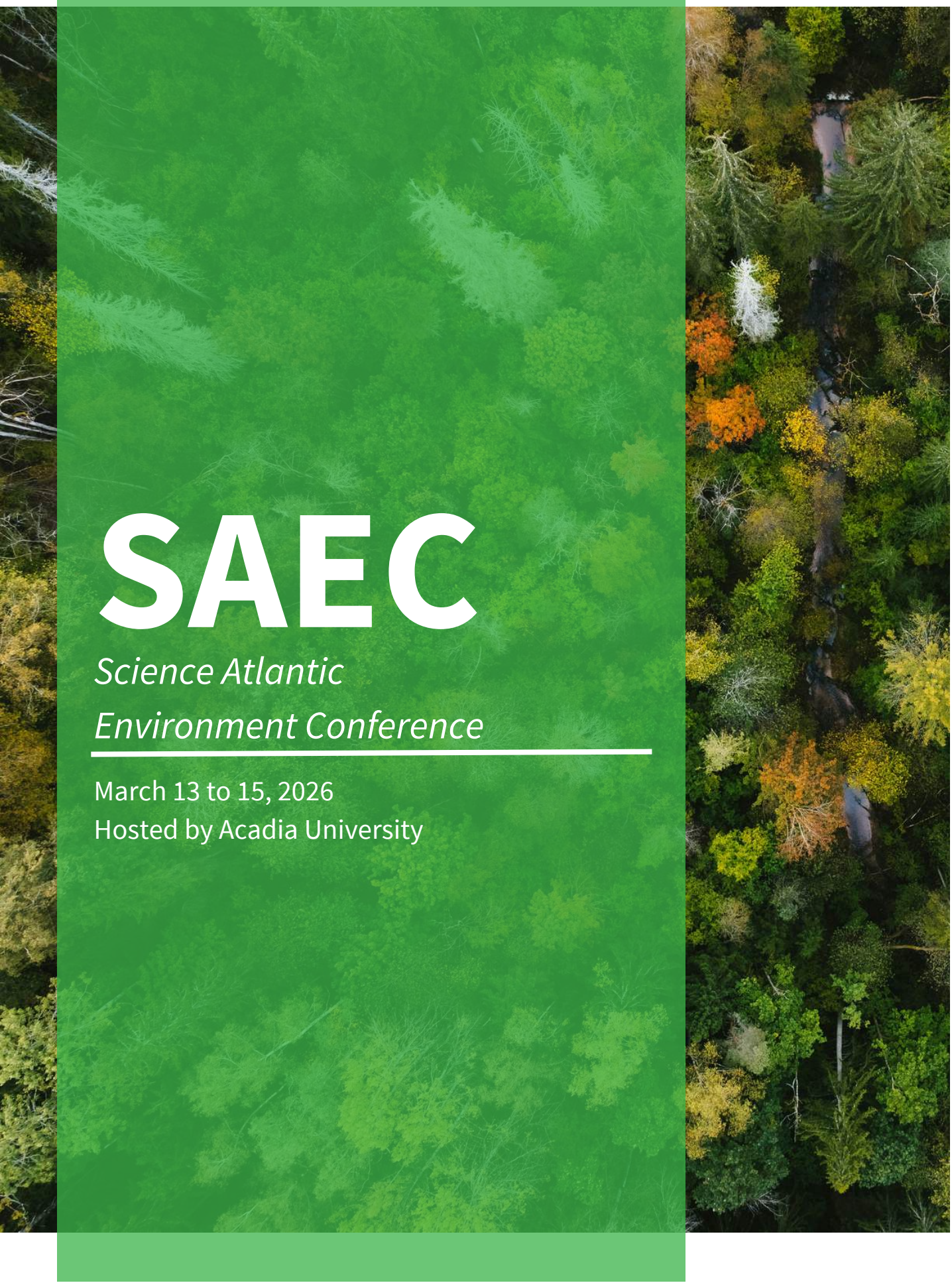

SAEC

Science Atlantic Environment Conference

March 13 to 15, 2026
Hosted by Acadia University

Science Atlantic Undergraduate Research Award

FIRST PLACE

Rebeca Pietrosanu
Dalhousie University

Finding Connection: Environmental Drivers of Atlantic Salmon (*Salmo salar*) Predicted Distribution in Napu'saqnuk (St. Mary's River)

Rebeca Pietrosanu[1], *Alana Westwood*[1], *Ben Collison*[1]
[1] *Dalhousie University*

Napu'saqnuk (St. Mary's River) is an ecologically significant watershed that supports one of the few Atlantic salmon (*Salmo salar*) populations that consistently return to their natal rivers on mainland Nova Scotia, Canada. Regardless, Napu'saqnuk populations have experienced steep declines, leading to their current designation as "endangered". Threats like forestry, agriculture, acidification, altered hydrology, climate change, and road development continue to disturb and fragment salmon habitat across the watershed. Little information exists on the environmental and spatial drivers of salmon distribution, and current methods of modelling these drivers in freshwater life stages remain limited. Species distribution models (SDMs) are valuable tools for predicting species occurrence and informing conservation decisions, yet no SDM has been developed for Atlantic salmon in Napu'saqnuk. This study aims to identify high-value salmon habitat, determine key environmental variables influencing predicted distribution, and identify major connectivity barriers to these critical habitats across Napu'saqnuk. Using a Maximum Entropy Model (MaxEnt), I will combine presence-only salmon occurrence data with key environmental variables to generate a predictive, correlative map of predicted occurrence probability. I will create a connectivity layer from known culvert locations to incorporate existing barriers to high-value habitat and identify priority barriers for remediation. The results of this research will delineate the extent of high-value salmon habitat across Napu'saqnuk and recommend priority culverts for remediation to effectively restore connectivity. These outcomes can guide efficient conservation resource allocation, support targeted habitat restoration, and contribute to the potential designation of Napu'saqnuk as Canada's first Ecologically Significant Area under the *Fisheries Act*.

Information on the **Science Atlantic Undergraduate Research Award** and the **Science Atlantic Science Communication Award** can be found on page 13 of the Yearbook.

SECOND PLACE

Rowan Norrad
Acadia University

Assessing the Impacts of River-Based Carbon Sequestration: Effects of River Alkalinity Enhancement on Dissolved Metal Concentrations in the West River, Nova Scotia

Rowan Norrad[1], Ian Spooner[1], Shannon Sterling[2]
[1]Acadia University, [2]Dalhousie University

Low pH conditions in the West River, Pictou Co, Nova Scotia that are a result of both natural and anthropogenic processes have resulted in elevated dissolved metal concentrations which are toxic to aquatic life. River alkalinity enhancement (RAE) is a process that has been applied where crushed alkaline minerals are added to the river and has the potential to sequester atmospheric carbon dioxide. RAE also enhances habitat quality by raising river pH which theoretically reduces dissolved metals. In this study, two years (2024-2025) of water quality data were collected from three sites along the West River to analyze whether RAE had impacts on the concentration of dissolved aluminum, iron, manganese, copper, and zinc. Sites were selected upstream of the addition location, directly downstream of the addition location, and at the head of tide. Towards the end of winter 2025 (March through May), data was collected while RAE was being added to the river. Water samples were collected and submitted to the Dalhousie Clean Water Lab where metal concentration was measured using ICP-MS. Temperature, pCO2, pH and conductivity data were collected using autonomous in-situ sensors. Preliminary year-to-year comparisons show changes in concentration of dissolved metals. However, the lack of significant change between upstream and downstream collection sites demonstrates that RAE for carbon dioxide removal does not have a pronounced effect on the concentration of dissolved metals. Data indicates that the 2025 drought had an impact on dissolved metal concentrations. These results provide transportable risk assessment guidance for RAE projects.

THIRD PLACE

Hannah MacKinnon
Cape Breton University

Comparing the Health of Mummichog (*Fundulus heteroclitus* (Linnaeus, 1766)) in Open Hearth Park After Remediation, to Various Reference Estuaries

Hannah MacKinnon[1]
[1]*Cape Breton University*

The Sydney Tar Ponds (formerly Muggah Creek) in Sydney, Nova Scotia, was historically one of Canada's most contaminated estuarine systems due to more than a century of steel production. Following large scale remediation efforts completed in 2013, the site was transformed into Open Hearth Park, raising important questions about the ecological recovery of the reconstructed estuary. This study evaluates the health of mummichog (*Fundulus heteroclitus*), from the remediated Tar Ponds in 2025 and compares them to individuals collected from two reference estuaries in Cape Breton: the Mira River and the Sydney River. In addition, contemporary samples are compared to pre-remediation data collected in 2007 to assess long-term ecological change. Mummichog were collected using standardized minnow trapping techniques, and 30 individuals per site were retained for laboratory analysis. Health was assessed using multiple indicators, including morphometric measurements (total length and body weight), Fulton's condition factor (*K*), bilateral fin ray symmetry (pectoral and pelvic fins), and qualitative assessments of external abnormalities. Fin ray counts were obtained following clearing and staining procedures using potassium hydroxide and Alizarin Red S to reveal calcified structures. By integrating condition indices, fin symmetry, and qualitative comparisons this study aims to determine whether mummichog health at the remediated Tar Ponds points to ecological recovery of the estuary and whether present-day individuals more closely resemble those from minimally impacted reference estuaries. These findings will contribute to understanding the long-term biological impacts of contaminated estuaries and provide valuable insight for future environmental monitoring and management of restored aquatic ecosystems.

Meghan Runge
Dalhousie University

River Geomorphology Shapes Fish Morphological Diversity Worldwide

Meghan Runge[1], Pablo Tedesco[2], Céline Jézéquel[2], Juan Carvajal-Quintero[1]
[1]Dalhousie University, [2]University of Toulouse

Despite freshwater environments accounting for a small fraction of global aquatic habitat, freshwater fish are highly diverse. A key facet of this diversity is morphology. Freshwater fish possess a range of unique shapes derived from their evolutionary histories and the environmental constraints imposed by freshwater systems. River geomorphology may play a crucial role in driving this diversity, as it defines the hydrology, habitat structure, and resource availability in freshwater environments. However, the contributions of these mechanisms to fish morphological diversity have not yet been well explored. To address this, we analysed the relationship between river geomorphology and global freshwater fish morphological diversity, with a specific focus on the impact on morphospace. We combined publicly accessible data on fish morphological ratios, fish observations, and river geomorphology, accounting for ~11,000 freshwater fish species, to construct linear models of morphospace versus geomorphology. Our initial analysis suggests the physical structure of rivers plays a key role in shaping freshwater fish morphology. We identified significant relationships between geomorphology and morphospace and found that these patterns are consistent between biogeographical realms. Presently, the geomorphology of rivers is being greatly altered by human activities such as dam construction, mining, and droughts due to anthropogenic climate change. Our findings will expand our understanding of how these changes impact fish morphological diversity, giving insight into the resilience of freshwater fish populations, globally. Furthermore, these results can inform which rivers and geomorphological features should be targeted by conservation and restoration efforts to maximize preservation of freshwater fish morphological diversity.

FIRST PLACE

Cassidy Bernard
University of New Brunswick, Fredericton

Age Validation in Slimy Sculpin (*Cottus cognatus*): A Comparison of Traditional and Otolith Microchemical Methods

Cassidy Bernard[1], *Michelle Gray*[1]
[1] *University of New Brunswick, Fredericton*

Slimy sculpin (*Cottus cognatus*) are small-bodied, freshwater, benthic fish that are used as a sentinel species in environmental monitoring. Aging of these fish can be done using their otoliths; however, age readings are typically ±1 year which is problematic as they have a lifespan of 6-7 years. This study was conducted to validate aging techniques for slimy sculpin, with the use of alizarin complexone, a calcium-binding chemical that fluoresces under specific light conditions. Slimy sculpin were collected from four sites in the Nashwaak River watershed using electrofishing. At each site visit, approximately 50 sculpin were tagged by visible implant elastomer (VIE) and immersed in an alizarin complexone solution for 24 hours. In total, 456 sculpins were tagged and treated, with 37 being sacrificed for otolith extraction and analysis. Otoliths were prepared for microchemistry and the examination of chemical marks, to determine the reliability of alizarin complexone as an age validation method. Results from year one relate to size distributions across (spatially), and within sites (temporally). This research is the first attempt to validate aging in slimy sculpin and contributes to refining methodologies for age estimation in small-bodied fish, further improving their use in environmental monitoring.

SECOND PLACE

KC Collings
Saint Mary's University

Melodies to Mates: The Effect of Male Song Complexity on Social and Genetic Mate Choice in European Starlings, *Sturnus vulgaris*

KC Collings[1], *Colleen Barber*[1]
[1] *Saint Mary's University*

Male songbirds sing to defend their territory and attract mates. They raise offspring with socialmates but sire offspring with genetic mates. Previous studies have identified a relationship between song complexity and reproductive success, but this relationship is highly variable among species. European starlings, *Sturnus vulgaris*, are a passerine species that sing long, complex songs that often incorporate mimicry. Both repertoire size and song bout length have been positively correlated with social mate attraction, early pairings and reproductive success. However, the role of mimicry remains unclear. Although starlings are socially monogamous, they have several reproductive strategies, one of which is extra-pair paternity where males mate outside their pair bond, producing offspring who are genetically unrelated to their social mate. No studies exist on the relationship between song and either genetic mate choice or total reproductive success (number of young within their nest and that of others). This study aims to examine the relationship between repertoire size, song bout length and mimicry and both social mate choice and genetic mate choice in male European starlings.

THIRD PLACE

Gretchen McPhail
Acadia University

Quantifying Changes in Mercury Bioaccumulation and Biomagnification in Invertebrate Food Webs Across a River-Ocean Continuum

Gretchen McPhail[1], *Mark Mallory*[1], *Nelson O'Driscoll*[1]
[1] *Acadia University*

Estuarine river systems transport mercury between land and sea, and changing biogeochemical processes influence its retention, speciation, and biological uptake along that continuum. Methylmercury (MeHg) is of principal concern due to its high bioaccumulation and biomagnification potential; however, changes in MeHg bioaccumulation dynamics in these systems are poorly quantified. In this study, we use aquatic invertebrate functional feeding groups (FFGs), stable isotopic ratios, and MeHg concentrations to interpret changes in MeHg food web dynamics across the Jijuktu'kwejk river and mudflats surrounding its outflow to the Minas Basin, Bay of Fundy. A total of 56 invertebrate taxa were collected and grouped into freshwater, brackish, and coastal ecosystem types. The MeHg concentrations of freshwater invertebrate FFGs increased from primary consumers to predators, where predatory taxa (mean MeHg 226.8 ± 136.0 and 105.8 ± 51.5 ng/g dry weight (dw)) frequently exceeded the Canadian guideline for the protection of wildlife consumers (137.6 ng/g dw). There was no trend in MeHg bioaccumulation among FFGs for brackish and coastal ecosystems, and mean MeHg concentrations (19.1 ± 23.3 and 15.7 ± 12.1 ng/g dw, respectively) were ~10 times below the guideline (202.5 ng/g and 161.9 ng/g dw, respectively). Additionally, trophic magnification slopes and factors (TMF) were significantly different between ecosystems ($p < 0.001$), where only the freshwater invertebrate community showed significant MeHg biomagnification (TMF >1). These data highlight high MeHg biomagnification potential in freshwater invertebrate communities relative to marine-influenced regions and furthers our knowledge of MeHg food web dynamics across highly connected but functionally distinct ecosystem networks.

Best Poster Presentation

FIRST PLACE

Ben Gooley
Acadia University

Bioaccumulation of Hg and As in Freshwater Invertebrates from Ponhook Lake, Nova Scotia: Effects of Fistorical Gold Mine Tailings

Ben Gooley[1], Ian Spooner[1], Nick Hill[2], Nelson O'Driscoll[1]
[1]Acadia University, [2]Southwest Biosphere Reserve Association

Historic artisanal and small-scale gold mining in Nova Scotia has left a legacy of mercury (Hg) and arsenic (As) contamination in lacustrine ecosystems across the province. These contaminants pose a significant risk to environmental health due to their toxicity and ability to bioaccumulate (Hg, As) and biomagnify (Hg). Our research at a tailings site on the northern shore of Ponhook Lake, Queen's Co., NS, is focussed on quantifying Hg and As concentrations in benthic communities and shoreline sediments. In the summer of 2025, we collected sediment samples along a 10 km transect of Ponhook Lake's northern shoreline, as well as a 1 km reference transect of the southern shore. These sediments were dried and reduced to silt-clay sized sediment using a 200 µm stainless steel sieve. The sorted sediments were analyzed for total mercury (THg) and total arsenic (TAs) using a NIC MA-3000 direct mercury analyzer and Epsilon 1 X-Ray Fluorescence for As. Preliminary analyses have shown elevated levels of THg concentrations (ranging 2.7-5787.6 ng g^{-1}; mean = 494.7 ng g^{-1}; Std Dev. = 1049.6 ng g^{-1}; n = 58) and TAs (ranging 11.1-1060.1 µg g^{-1}; mean = 108.5 µg g^{-1}; Std Dev. = 183.3 µg g^{-1}; n = 60) at Ponhook Lake. THg concentrations near the mine tailings exceed the Canadian interim sediment quality guidelines (ISQGs) of 170 ng g^{-1}. TAs concentrations exceed the ISQG of 5.6 µg g^{-1} in all samples collected due to local geologic influences.

SECOND PLACE

Lara Dalton
Cape Breton University

Echoes of Bell: Investigating Bumblebee Foraging Acoustics at Beinn Bhreagh Estate

Lara Dalton[1], *Alana Pindar*[1]
[1] *Cape Breton University*

Ecoacoustics provides a non-invasive approach to studying pollinator behaviour and plant-pollinator interactions. Bumble bees (*Bombus* spp.) produce characteristic foraging frequencies that may vary among species and in response to floral identity and environmental conditions. This study examined whether the fundamental and peak frequencies of foraging bumble bees differ among species, flowering plant taxa within the families Rosaceae and Fabaceae. Field recordings were conducted at Beinn Bhreagh in Baddeck, Nova Scotia, the historic estate of Alexander Graham Bell. The site offers both diverse floral resources and historical significance in acoustic science. Bell's invention of the telephone, designed to transmit sound, provides a meaningful connection to this research, which uses modern smartphone technology—an evolution of Bell's work—to record and analyze pollinator acoustics in a natural setting. Recordings were collected from actively foraging bumble bees using an iPhone paired with a RODE Reporter microphone equipped with a wind cover. A total of 149 recordings were analyzed, representing seven *Bombus* species foraging on six flowering species (three per plant family). Fundamental and peak frequencies were extracted using Audacity. Linear mixed models were used to compare frequencies among bee species, plant taxa, and environmental variables including wind speed, temperature, flower color, and time of day. Both fundamental and peak frequencies varied among *Bombus* species and flowering taxa, with additional patterns linked to environmental conditions. These findings demonstrate that foraging acoustics are shaped by species identity, floral resources, and abiotic factors, highlighting the value of ecoacoustics for understanding pollinator-plant interactions.

THIRD PLACE

Joshita P S Senthil Kumar
Dalhousie University,
Faculty of Agriculture

Quantum Dot-Assisted Spectrum Controlled Greenhouse Tarps to Boost Crop Production

Joshita P S Senthil Kumar[1], *Siddharth Khatri*[1], *Umair Sohail*[1], *Msughter Guusu*[1], *Gurpreet Singh Selopal*[1]
[1] *Dalhousie University, Faculty of Agriculture*

Greenhouse technology plays a key role in sustainable agriculture, but the inefficient use of solar spectrum light limits crop productivity. Conventional greenhouse covers do not effectively regulate the spectral quality of incoming light, which results in suboptimal photosynthesis and energy inefficiency. Quantum dots (QD) are tiny-sized nanocrystals (diameter less than 20 nm) with promising optoelectronic properties and the ability to control the emission light spectrum by engineering their size, shape and composition. Due to these unique features of QDs, embedding QDs into greenhouse tarps can tune the light transmission toward photosynthetically active radiation (PAR) regions. However, the precise relationship between optoelectronic and structural properties of QDs to maximize PAR content and improve crop production remains underexplored. This study aims to optimize QD-assisted tarp for enhanced light-use efficiency in greenhouse environments to boost lettuce production. Results of the spectral analysis of QD-based tarps vs control tarps to assess their light-modulating properties will be presented. Additionally, evaluation of the yield, plant growth and gas exhange responses under different tarps will be discussed. These findings are anticipated to enhance crop yields while supporting sustainable agricultural practices by contributing to climate-resilient food production and advancing greenhouse technologies to tackle global food security challenges.

Acadian Forest Region Award

Eve Pole
Acadia University

Arsenic Accumulation in Alder Trees at a Legacy Gold Mine Tailings Impoundment in Southwest Nova Scotia: Implications for Environmental Risk

Eve Pole[1], *Ian Spooner*[1], *Sarah Hines*[1], *Nelson O'Driscoll*[1]
[1]*Acadia University*

Heavy metal contamination from gold mine tailings poses significant ecological risks, particularly through the bioaccumulation of elements such as arsenic in local vegetation. We investigated patterns of arsenic and other heavy metal accumulation in alder trees (*Alnus* spp.) growing near legacy gold mine tailings sites in southwestern Nova Scotia. Alder has been chosen as the target species due to their ecological importance as a food source, tolerance to disturbed environments, and to better understand their potential as a phytostabilizer. Field sampling involved collecting alder tissues including leaves, catkins, and branches, as well as associated soil and water samples, which were analyzed for metal concentrations using X-ray fluorescence (XRF) and inductively coupled plasma spectrometry (ICP-MS). Arsenic levels in tailings (430 – 3200 ppm) and associated groundwater (350 – 5600 ppb) were elevated above both baseline values and CCME guidelines. Alder catkins have the highest arsenic concentrations (1300 ppb) and branches the lowest (290 ppb) and greatly exceed concentration in non-tailings samples. Though alder is not considered to be arsenic hyperaccumulators, our data suggest that on contaminated tailings alder may be a vector for As bioaccumulation, most notably for birds that feed on catkins.

About the Acadian Forest Region Award

The **Acadian Forest Region Award** is awarded annually at the Science Atlantic Environment Conference for the best oral or poster presentation of undergraduate student research relating to the flora or fauna of the Acadian Forest region. The award is sponsored by the K.C. Irving Environmental Science Centre.

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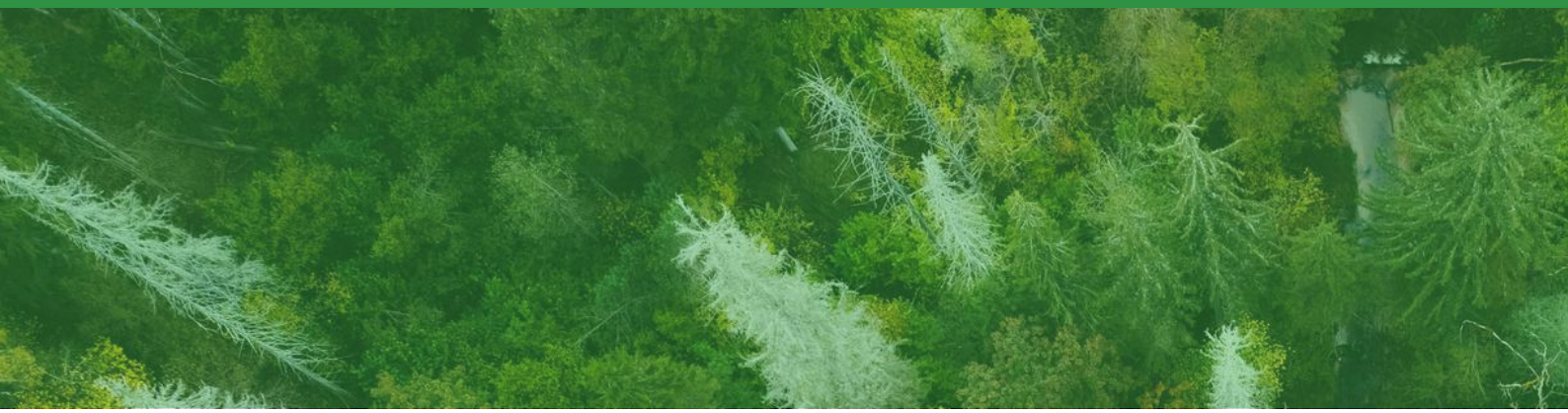

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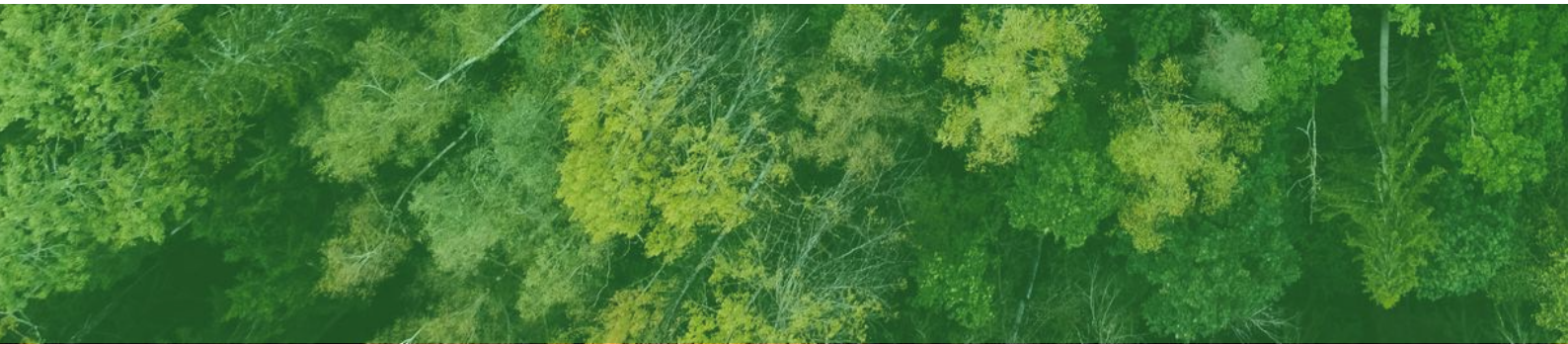

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Nutrition and Foods Conference

March 27 and 28, 2026

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FIRST PLACE

Zach Adams
Acadia University

Sea Meets Sweet: Sensory Insights Into Fermented Laver-Infused Chocolate

Zach Adams[1], *Matthew McSweeney*[1]
[1]*Acadia University*

Introduction: Seaweed is increasingly promoted as a novel, sustainable food source that could satisfy a key role in Western food systems in the near future. Despite a growing body of research indicating uses for seaweed as an ingredient rather than a raw material for critical food components, adoption rates among Western consumers remain low. Seaweed enriched foods are often disliked by consumers due to their addition of undesirable flavours to foods, including fishy and marine flavours typical of seafood.

Objective: The objective of this study was to evaluate how fermentation can impact the flavour properties of *Porphyra umbilicalis* (laver), an underutilized seaweed.

Materials and Methods: This study investigated the enrichment of 54.5% dark chocolate with *Porphyra umbilicalis* fermented with three different cultures: two bacteria (*Streptococcus thermophilus* (ST) and *Pediococcus pentosaceous* (PP)) and one yeast (*Aspergillus oryzae* (AO)). Five formulations were tested for acceptability using a nine-point hedonic scale and two check-all-that-apply (CATA) questionnaires for sensory perception and emotional responses by consumers (n = 83).

Results: All formulations including seaweed significantly reduced consumer liking of the chocolate, although the samples containing seaweed fermented with AO were liked significantly more than the other samples containing seaweed ($p<0.05$).

Conclusion: These findings suggest that fermentation of seaweed using AO may increase consumer acceptance of seaweed among Western consumers when added to familiar products that do not typically contain seaweed. Future research should further investigate consumer responses to different varieties of seaweed or alternate fermentation cultures.

Information on the **Science Atlantic Undergraduate Research Award** and the **Science Atlantic Science Communication Award** can be found on page 13 of the Yearbook.

SECOND PLACE

Madeleine Graham
University of Prince Edward Island

Preliminary Outcomes of a Digital Food-Skills and Self-Efficacy Program for Adults With Intellectual and Developmental Disabilities

Madeleine Graham[1], *William Montelpare*[1], *Sarah Finch*[1]
[1] *University of Prince Edward Island*

Introduction: Adults with intellectual and developmental disabilities (IDD) experience disproportionately low diet quality and limited food preparation skills, contributing to preventable health risks and reduced independence. Evidence-based, accessible food-skills interventions tailored to their needs remain scarce.

Objective: To examine changes in task-specific self-efficacy and patterns of behavioural engagement across a 4-week digitally delivered food-skills program with a 3-week follow-up period.

Methods: Adults with IDD (n=10; 9 completing) participated in an online intervention guided by the Behaviour Change Wheel and COM-B incorporating video-modelled food-skill instruction, weekly motivational interviewing (MI) check-ins, and caregiver support. Self-efficacy was assessed at baseline, post-intervention, and follow-up.

Results: Baseline self-efficacy was moderate to high, with 70% reporting confidence in finding time for their goals. Although scores were largely maintained at follow up, there was a slight reduction in self-efficacy related to time and competing demands. At week 1, only 10% of participants met the ≥3 practice/week expectation but at week 4, practice frequency increased to 40% meeting this goal. Initial food skill goals were 80% met by week 4 and 90% met by week 7. Further goals were developed for participants that met their initial goals. MI check-ins revealed physical opportunity particularly limited time for practice within structured routines and difficulty accessing desired food items as the primary barrier to skill practice.

Conclusion: Digitally delivered, MI-supported food-skills program can support stable or improved self-efficacy and gradual increases in practice among adults with IDD. Addressing physical-opportunity barriers is essential to sustaining momentum and supporting ongoing skill development.

THIRD PLACE

Ben Taj
Memorial University of Newfoundland

Higher Screen Time is Associated With Lower Dietary Quality and Increased Adiposity in Children

Ben Taj[1], *Zahra Farahnak*[1]
[1] *Memorial University of Newfoundland*

Introduction: Evidence suggests that a higher screen time is associated with an increased risk in obesity in children. This study examines the effect of screen time on food choices and dietary intake in children aged 6-12 in St. John's and surrounding areas. Understanding how screen time influences dietary habits is important in populations at a higher risk of obesity.

Research Question: Whether increased screen time is associated with unhealthy food choices and risk for obesity.

Objectives: To examine the effects of screen time and food choices and dietary intakes in children 6-12 in Newfoundland and Labrador.

Methods: Boys and girls (n=9) completed a screen time questionnaire and fat mass was assessed using a BIA. Three 24-hour recalls were completed using the ASA24 tool to assess dietary intake and HEFI-2019 scores were calculated. Mann-Whitney U Test and Spearman correlation were performed.

Results: Participants had a median age of 8.67 years (range:7.42-11.92), 67% were female, 44% were born in NL, and 56% were white. The median average screen time was 3.1h (range:1.6-13.3). HEFI-2019 scores were 35.81 (range:25.89-39.65). To be shown in presentation.

Discussions: Our preliminary results showed that higher screentime is associated with lower iron, folate and calcium intake as well as higher fat mass and fat mass indices. Higher weekend screen time was associated with lower HEFI-2019 scores indicating lower poorer diet quality as screen time increases.

Conclusion: Higher screen time in children seems to be linked with poorer nutrient intake, lower overall diet quality and increased adiposity in children.

Levannia Lildhar
University of Prince Edward Island

Implementing Climate Adaptations in Agriculture and Access to Local Markets: Producers' Practices and Perspectives

Levannia Lildhar[1], Jennifer Taylor[1], Meagan Moynagh[2]
[1]University of Prince Edward Island, [2]PEI Federation of Agriculture

Introduction: Resilient agricultural systems contribute to a more food secure society, so it is important to understand how to promote agricultural resiliency in response to climate change effects. While many policies and programs exist to support food producers in improving agricultural resiliency, these are often conceived at the systems level, rather than from the perspective of producers who will implement them. This misalignment can lead to a lack of uptake or incorrect implementation. Research is needed to determine barriers to climate change adaptation from the perspective of producers and how these can be addressed to adapt to climate change and improve local food access and availability.

Research Objective: The Prince Edward Island Federation of Agriculture (PEIFA) recently completed an adaptation plan (2025-2030), which outlines actions to support producers' adaptations to climate change. This study aims to assess the extent to which producers implement the identified actions, the barriers they face, and how to overcome these barriers to improve local food access.

Methods: Producers will be surveyed across two growing seasons to address variability in climate and commodities. An online (and mail) survey will assess (i) producer and farm characteristics, (ii) climate-related risks and barriers to resilience, and (iii) perceived impacts on food access and availability. Results will be summarized to characterize producer demographics, response frequencies, and trends across agricultural sectors.

Results/Conclusions: Findings will provide empirical evidence of producer-identified priorities, for climate resiliency in PEI agriculture. It will also provide insights into what is needed to strengthen local food systems.

FIRST PLACE

Hannah White
Memorial University of Newfoundland

Muscle Mass and Strength Responses to Docosahexaenoic Acid (DHA) and Vitamin D Co-supplementation in Male and Female Rats on a High-Fat Diet

Hannah White[1], *Anna-Marie Cooney*[1], *Zahra Farahnak*[1]
[1] *Memorial University of Newfoundland*

Introduction: Recent evidence suggests that vitamin D and DHA can reduce fat accumulation which may improve muscle metabolism.

Objective: This study assesses the impact of vitamin D, DHA and their co-supplementation on muscle metabolism in rats fed a high fat (HF) diet.

Methods: Eight-week-old male and female Sprague-Dawley rats (n=96) were randomly assigned to either control (AIN-93M), HF diet (35% kcal fat), HF+low vit D (D) (0.05 IU/g), HF+D (3 IU/g), HF+DHA (1% dietary weight), or HF + DHA (1%) + D (3 IU/g) for 8 weeks. Muscle grip strength was measured at week 0, 4, and 8, along with collection of blood samples and muscle tissues (gastrocnemius, quadriceps and soleus). Serum IGF-I concentrations were measured. Data was tested using Linear Mixed Model and Spearman's correlation ($P<0.05$).

Methods: Muscle mass (bilateral sum of gastrocnemius, quadriceps and soleus) was higher in the HF+DHA+D group (12.05±0.8 g (Mean ± SEM) than in controls (10.20±0.81g) ($P<0.001$), with males having greater muscle mass ($P<0.001$). Serum IGF-I concentrations were also higher in the HF+DHA+D (1098.21±0.2 (ng/mL)) than controls (862.75±66.3). Interestingly, forelimb (720.61±52.60 gf) and forelimb + hindlimb muscle strength (1033.43±81.09) were higher in the HF+DHA+D group than controls (648.75±52.75, 1007.95±60.98) ($P<0.001$). Females exhibited higher muscle strength to weight ratios ($P<0.001$). IGF-I concentrations correlated positively with muscle mass and quadriceps ($r=0.67$, $P<0.001$).

Conclusions: Preliminary findings showed co-supplementation increased muscle mass and IGF-I, with males showing greater muscle mass but females a higher muscle strength to weight ratio, highlighting sex-differences in muscle function.

SECOND PLACE

Wangfang Ye
Dalhousie University,
Faculty of Agriculture

Green Extraction of Functional Protein From *Chlorella pyrenoidosa* and Valorization of Residues via Hydrothermal Liquefaction

Zijing Wang[1], *Wangfang Ye*[1], *Quan He*[1]
[1] *Dalhousie University, Faculty of Agriculture*

Introduction: Microalgae are emerging as nutrient-dense protein sources for sustainable foods, but current extraction processes often give modest yields, damage functionality, and leave residual biomass under-utilized.

Objectives: This work aimed to (1) develop a mild extraction process to obtain a functional protein ingredient from *Chlorella pyrenoidosa* and (2) valorize the remaining biomass by producing biofuel precursors via hydrothermal liquefaction.

Methods: Dried *Chlorella pyrenoidosa* powder was dispersed in NaCl solution and treated with ultrasound under optimal conditions, followed by isoelectric precipitation at pH 4.5 to obtain a protein-rich fraction. Residual solids and side streams were converted to biocrude in subcritical water using batch hydrothermal liquefaction; product yields and energy recovery were determined.

Results: The optimized process recovered about 62% of the total protein into a concentrated fraction. Ultrasound treatment markedly enhanced emulsifying performance: at 10 mg/mL, the ultrasound-treated protein gave a higher emulsifying activity index (approximately 37 m2 /g) and about 96% stability index, smaller droplet size (13 µm vs 22 µm for the native protein), yielding emulsions that remained stable for up to 360 min. Hydrothermal liquefaction of extraction residues at 320℃ generated up to about 40 wt.% energy-dense biocrude with a higher heating value of 36 MJ/kg.

Discussion: Combining gentle fractionation with hydrothermal conversion links food-ingredient production to energy recovery, improving overall biomass utilization and supporting a circular bioeconomy.

Conclusions: Chlorella-derived protein concentrates show promising functionality as sustainable emulsifiers, while hydrothermal liquefaction offers a viable route to valorize extraction residues as biofuel precursors.

THIRD PLACE

Jacob Hearty
Memorial University of Newfoundland

The Association Between Milk and Dairy Product Consumption and Body Fat and Weight Status in School-Aged Children in St. John's NL: Milk Study

Jacob Hearty[1], *Zahra Farahnak*[1]
[1] *Memorial University of Newfoundland*

Introduction: Childhood obesity is a significant public health concern, particularly in Newfoundland and Labrador, which reports Canada's highest provincial rates (46.1%). While dairy provides essential nutrients for growth, consumption is declining. Understanding the relationship between dairy intake and adiposity is critical for developing effective childhood obesity prevention strategies.

Objectives: This study described dairy consumption patterns in children aged 6-12 years and examined associations between intake and body composition. Secondary objectives included exploring the influence of age, sex, puberty, and socioeconomic factors on these variables.

Methods: Participants completed 3-day 24-hour diet diaries and a dairy habit survey. Anthropometric and body composition data including height, weight, waist/hip circumference, grip strength, and fat mass percentage, were collected via bioelectrical impedance analysis using the TANITA MC-780U Plus.

Results: Mean body fat was 24.8 ± 6.7% (range 17.8-34.3%). Median daily dairy energy intake was 701.8 kcal/day (IQR 504.3-817.5). Body fat varied by intake levels: low intake (<500 kcal/day) averaged 25.95%, moderate intake (500-800 kcal/day) 23.8%, and high intake (>800 kcal/day) 25.2%.

Discussion: These trends suggest a potential threshold where moderate dairy intake supports lower body fat, whereas very high intake may contribute excess calories without providing additional adiposity benefits.

Conclusions: These preliminary insights into dairy consumption patterns in NL school-aged children can inform targeted nutrition programs. Further research with larger, more diverse cohorts is needed to validate these trends and further clarify the role of dairy in childhood body composition.

FIRST PLACE

Valerie Dawe
Memorial University of Newfoundland

Can an Invisible Sugar-Sweetened Beverage Tax Influence Consumer Beverage Intake Behaviours in Newfoundland and Labrador? A Cross-Sectional Analysis of Tax Implementation and Sugar-Sweetened Beverage Intake

Rachel Prowse[1], *Valerie Dawe*[1]
[1] *Memorial University of Newfoundland*

Introduction: The NL SSB tax was implemented September 1, 2022. We found that stores varied in implementation.

Objectives: We aimed to assess whether store-level implementation was associated with SSB intake in consumers.

Methods: Implementation levels included high implementation: SSB tax clearly displayed on shelf and receipt. Medium implementation: SSB tax clearly displayed on shelf but not on receipt. Low implementation: stores did not display the tax on shelf or receipt. Total volume of taxable SSBs consumed per week was calculated by summing all taxable SSBs listed by the participants in our survey. We analyzed the data using 3 multiple linear regression models. The first was unadjusted: SSB intake and levels of store implementation. The second was unadjusted: SSB intake and primary store where participants shopped. Finally, we ran the full adjusted model: SSB intake, store implementation level, and covariates.

Results: In our first unadjusted model, when compared to low implementation level, high implementation was negatively associated with taxable SSB intake (b=-0.089, p=0.023). In the second unadjusted model, primary store was not associated with SSB intake (F(5, 968) (b=1.638, p=0.15). After adjusting for covariates, store implementation level was no longer significantly associated with taxable SSB intake. However, many sociodemographic factors were significantly associated with taxable SSB intake.

Conclusion: The implementation level of stores did not predict taxable SSB intake, after controlling for sociodemographic variables.

Discussion: The NL SSB tax has generally been implemented with limited communication to consumers at the point of sale which likely hindered the efficacy of the tax.

SECOND PLACE

Charlotte Schofield
Memorial University of Newfoundland

Child-Directed Food Marketing in Everyday Environments: An Observational Study in St. John's, Newfoundland

Charlotte Schofield[1], *Rachel Prowse*[1]
[1]*Memorial University of Newfoundland*

Introduction: Food marketing is a public health concern because advertising for foods high in sugar, sodium, and saturated fat influences children's preferences, purchase requests, and dietary patterns. However, little research has examined how child-directed food marketing appears across everyday environments in Canada.

Objective: To identify which settings in St. John's, Newfoundland, contain the highest proportion of child-directed food marketing and assess the healthfulness of promoted foods.

Methods: A cross-sectional observational study assessed food marketing across seven publicly accessible settings, including restaurants, retail stores, and recreational venues. Marketing exposure was recorded using wearable eye-tracking technology (Tobii Pro Glasses 3). Still images were extracted at seven-second intervals and coded using a framework based on established marketing indicators. Nutritional classification used the University of Toronto Food Classification List. Descriptive statistics summarized the frequency and proportion of child-directed and unhealthy marketing.

Results: Across seven settings, 455 marketing instances were identified, of which 189 (41.5%) were child-directed. Nutritional information was available for 443 instances, and 359 (81.0%) promoted unhealthy products. Among child-directed marketing, 179 of 189 instances (94.7%) promoted unhealthy products, compared with 180 of 254 instances (67.7%) among marketing not directed at children.

Discussion: Child-directed marketing was overwhelmingly associated with unhealthy products. While unhealthy foods dominated marketing overall, the substantially higher proportion among child-directed promotions suggests that children may be disproportionately exposed to nutritionally poor food marketing in everyday environments.

Conclusion: These findings highlight the need for stronger policies and environmental interventions to reduce children's exposure to unhealthy food marketing.

THIRD PLACE

Miya Burden
Memorial University of Newfoundland

Effects of Maternal Omega-3 PUFA Diets on Interleukin-6 Gene Expression in Adult Offspring of Maternal Immune Activation C57BL/6 Mouse Model

Miya Burden[1], *Sukhinder Cheema*[1]
[1] *Memorial University of Newfoundland*

Introduction: Third-trimester inflammation during pregnancy can disrupt fetal neurodevelopment, increasing risk of schizophrenia (SCZ)-like deficits in offspring. Omega (n)-3 polyunsaturated fatty acids (PUFAs) exhibit anti-inflammatory and neuroprotective properties, thus may prevent SCZ-like deficits.

Hypothesis/Objectives: Maternal immune-activation (MIA) has been shown to increase inflammation and Interleukin (IL)-6 gene expression. I hypothesized that adult offspring of MIA mouse model dams fed high n-3 PUFA diets will have lower IL-6 gene expression, compared to low n-3 PUFA diets.

Methods: Pregnant C57BL/6 dams received an intraperitoneal injection of lipopolysaccharide (LPS; 0.1 mg/kg) or saline on gestation day 14.5 and fed either high or low n-3 PUFA diets (5% or 1% w/w total fatty acids) until weaning. All offspring were placed on standard chow diets and underwent behavioural testing at postnatal day (PND) 21 and PND 60. Brain cortex samples were collected at PND 60, snap frozen, and stored at −80 °C. IL-6 gene expression was quantified using real-time quantitative PCR (RT-qPCR) with beta-actin (ACTB) as a housekeeping gene (n=6 per treatment). Gene expression analysis used the ΔΔCT method and two-way ANOVA; $p<0.05$ was considered significant.

Results: Both female ($p= 0.008$) and male ($p= 0.03$) offspring, from dams fed a high n-3 PUFA diet and treated with LPS, exhibited significantly lower IL-6 gene expression, compared to a low n-3 PUFA diet.

Discussion: These results suggest that maternal diets high in n-3 PUFA may contribute to anti-inflammatory and neuroprotective effects in offspring of MIA dams. (Funded by NSERC-Discovery grant).

Prix de la meilleure communication de recherche en français

Sabrina Dahmani
Université de Moncton

Des aliments nutritifs, oui, mais à quel prix ? Étude prospective dans quatre enseignes dominantes au Nouveau-Brunswick

Sabrina Dahmani[1], *Carole C. Tranchant*[1], *Jeanne Godin*[1]
[1] *Université de Moncton*

Introduction: Des facteurs macro- et microéconomiques ainsi que des tensions géopolitiques persistantes fragilisent l'accessibilité à une alimentation saine, accentuant les inégalités sociales de santé. L'analyse des dynamiques locales des prix alimentaires apparaît essentielle pour aider les ménages à faire des choix éclairés.

Objectifs et hypothèses: Analyser les variations de prix d'une sélection d'aliments sains, à l'aide d'une méthodologie simple mais rigoureuse s'appuyant sur le Panier de provisions nutritif (PPN) de Santé Canada, en examinant l'influence des enseignes et des saisons au Nouveau-Brunswick. Des écarts de prix selon ces deux variables sont anticipés.

Méthodes: À partir du PPN complet, 21 aliments ont été sélectionnés afin de confectionner un PPN simplifié (PPN-S) mettant l'accent sur le coût des aliments sains tout en simplifiant la collecte des données. Celle-ci fut réalisée par audit dans quatre détaillants alimentaires dominants, avec sept points de vente dans deux villes, selon un plan d'échantillonnage rigoureux. Le ratio coût PPN-S/coût PPN a été évalué, suivi d'une analyse corrélationnelle.

Résultats: Considérant le prix du PPN-S, les résultats ont permis d'identifier deux enseignes affichant des prix contrastés. Pour ces deux enseignes, le ratio des coûts PPN-S/PPN était stable et la corrélation PPN vs. PPN-S fortement significative ($r=0,87$; $p=0,005$). De plus, nos données révèlent l'existence d'écarts de prix significatifs entre les détaillants et les saisons.

Pertinence: Le PPN-S offre un outil cohérent pour mieux comprendre les facteurs influençant les prix alimentaires à l'échelle locale et améliorer l'accès à une nourriture saine et abordable.

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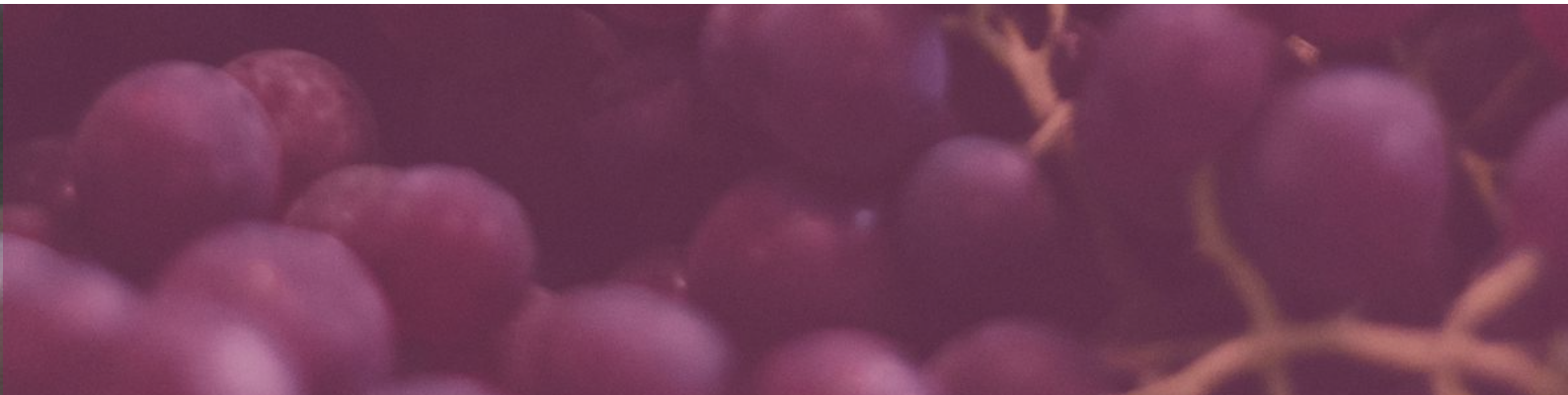

ChemCon

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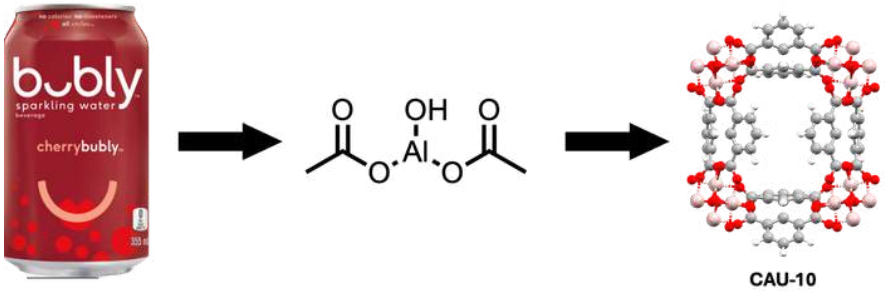
Science Atlantic Undergraduate Research Award

Brianna Aubé
University of New Brunswick, Fredericton

Waste Aluminum as a Sustainable Metal Precursor

Brianna Aubé[1], *Barry Blight*[1]
[1] *University of New Brunswick, Fredericton*

Metal-organic frameworks (MOFs) are a class of materials with tuneable properties and a wide range of applications, from water harvesting to gas sequestration and separation to catalysis, and many others. Some drawbacks of these materials are the precursors, solvents, and energy expense of their synthesis. A wide range of metals can be used, including aluminum, which is abundant and cheap. Aluminum, however, is extremely energetically intensive to refine and the current aluminum precursors used for MOF synthesis are toxic, corrosive, and are not derived from a sustainable source of aluminum. This paper explores the synthesis of a safer aluminum precursor from recycled aluminum and other renewable sources, and applies this novel precursor to the synthesis of existing MOF materials.



Information on the **Science Atlantic Undergraduate Research Award** and the **Science Atlantic Science Communication Award** can be found on page 13 of the Yearbook.

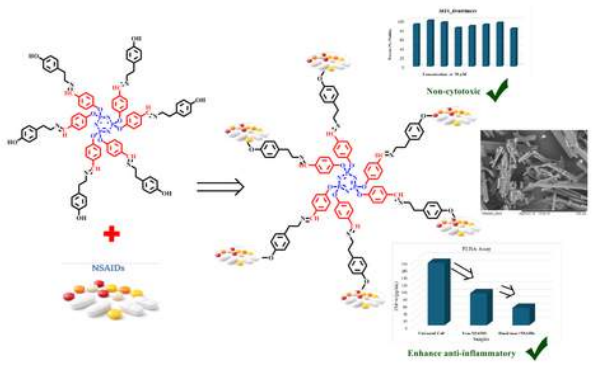
Ziad Mohamed
University of Prince Edward Island

Enhancement of NSAIDs Anti-Inflammatory Activity Through Conjugation With Schiff-Base Cyclotriphosphazene Dendrimer

Ziad Mohamed[1], *Amani Abdelghani*[1]
[1] *University of Prince Edward Island*

A series of seven first-generation cyclotriphosphazene-based dendrimers incorporating Schiff-base linkages and conjugated to nonsteroidal anti-inflammatory drugs (NSAIDs) was synthesized. Structural confirmation was achieved using attenuated total reflectance-Fourier transform infrared (ATR-FTIR) spectroscopy, proton and phosphorus nuclear magnetic resonance spectroscopy (^{1}H and ^{31}P NMR), and elemental analysis. Morphological analysis was achieved using Scanning electron microscopy (SEM), which revealed distinct surface morphologies, including crystalline, rod-, sheet-, needle-, and sponge-like structures, highlighting the diversity arising from drug conjugation. Thermogravimetric analysis (TGA) showed that drug-conjugated dendrimers have greater thermal stability than unfunctionalized dendrimers, suggesting that attaching drugs to the dendritic structure enhances their thermal stability. The cytotoxicity of the dendrimers was evaluated in RAW-264.7 macrophages using the 3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium (MTS) assay. Their anti-inflammatory activity was assessed by quantifying tumor necrosis factor-alpha (TNF-α) secretion levels in cell culture supernatant using enzyme-linked immunosorbent assay (ELISA). All drug-conjugated dendrimers maintained cell viability above 80% at 50 µM. Under non-stimulated conditions, i.e., in the absence of lipopolysaccharide (LPS, a proinflammatory stimulus), **Indo-D7**(dendrimer-conjugated indomethacin) and **Sul-D8** (dendrimer-conjugated sulindac) showed TNF-α levels of 26.4 ± 5.52 pg/mL and 31.3 ± 5.12 pg/mL, respectively, compared with untreated cells (172.3 ± 4.52 pg/mL). These values represent TNF-α reductions of 47.9% and 47.6% relative to the free drugs indomethacin and sulindac (50.75 ± 4.80 pg/mL and 59.78 ± 5.37 pg/mL, respectively). RAW 264.7 macrophages were polarized from a non-inflammatory to a pro-inflammatory state by LPS stimulation (1 µg/mL), and the dendrimer-drug conjugates exhibited significant anti-inflammatory efficacy.

For example, **Ibu-D4** (dendrimer-conjugated ibuprofen) reduced TNF-α levels to 19.76 ± 5.76 pg/mL compared with LPS-treated cells (382.1 ± 9.53 pg/mL), representing an 87.3% reduction relative to free ibuprofen (155.9 ± 11.05 pg/mL). Similarly, **Mef-D3** (dendrimer-conjugated mefenamic acid) reduced TNF-α levels to 42.46 ± 3.04 pg/mL, corresponding to a 76.2% reduction relative to free mefenamic acid (178.12 ± 7.02 pg/mL). These results demonstrate that Schiff base cyclotriphosphazene-based dendrimers modulate macrophage inflammatory responses in both naïve (non-inflammatory) and LPS stimulated (pro-inflammatory) macrophages in vitro, highlighting their potential to enhance the anti-inflammatory efficacy of NSAIDs.



About Cameron Forbes

Cameron Forbes was a truly one-of-a-kind individual—genuine, compassionate, and deeply caring. His presence will be profoundly missed by the CBU Chemistry Department, CBU, and the entire university community.

His leadership, both inside and outside the classroom and lab, along with his selfless generosity in sharing time and knowledge, left a lasting impact. A natural in the classroom, Cameron was also exceptional at the lab bench, fully dedicated to his work, his learning, and his friends at CBU. Cameron was a valued member of the CHArTl (MacQuarrie Research Group), where he contributed to research activities and collaborative projects.

He will be remembered fondly for his bright smile, tie-dyed t-shirts and lab coats, and his contagious ability to spark conversations with anyone he met.

Claire MacLean
Saint Mary's University

An Exploration of Nonaqueous EC-SERS for Inorganic Complexes

Claire MacLean[1], *Christa Brosseau*[1], *Jason Masuda*[1]
[1] *Saint Mary's University*

Electrochemical surface-enhanced Raman spectroscopy (EC-SERS) is a tool that strongly enhances the Raman signal of molecules and enables target analytes to be studied spectroscopically during electrochemical processes. As the signal obtained in EC-SERS is reliant on the polarizability of a molecule, aqueous systems are most commonly studied. For molecules that are insoluble in water, nonaqueous EC-SERS has become a recent field of interest. This study details the use of nonaqueous EC-SERS to explore the spectroscopic changes that accompany the redox processes of two metallocene complexes: ferrocene and cobaltocene. Improving our knowledge of metallocene redox processes is useful for understanding electron transfer mechanisms and changes in structure that relate to charged states. This talk will discuss preparation of the EC-SERS substrates, spectroelectrochemical measurements and obtained spectra, and computational comparisons.

Canadian Association of Theoretical Chemists Award

Siri Williamson
Dalhousie University

Modelling Molecular Rotations With Analog Quantum Computing

Siri Williamson[1], *Ryan MacDonell*[1]
[1] *Dalhousie University*

The development of quantum technology over the last few decades has opened new pathways to solving more complex computational problems. While the goal of a universal, fault-tolerant quantum computer is still out of reach, success has been found with modelling quantum chemical systems with analog quantum simulators. Analog quantum simulators are dedicated devices restricted to simulating a limited class of quantum systems: the evolution of the desired quantum system is mapped onto the controlled evolution of the simulator.

Developing an algorithm for rotational motion lays the foundation for modelling more complex dynamics, such as coupling between rotational and vibrational modes. This phenomenon, known as Coriolis coupling, is crucial in computing accurate rovibrational spectra, which are used to identify molecules present in the interstellar medium. Classical methods are limited by requiring numerical approximations or high-quality experimental spectra to use as refinement data.

We have developed the first quantum algorithm for the simulation of rigid rotors. Our algorithm is adapted for present-day quantum simulators by using two vibrational modes to represent rotational modes. We show that our algorithm can produce accurate rotational spectra for different types of rigid rotors. This allows for the addition of vibrational modes for exact computation of Coriolis coupling. Future work includes using a non-rigid rotor model, which will allow for simulation of floppy molecules with more complex internal dynamics.

About the Canadian Association of Theoretical Chemists (CATC) Award

The **Canadian Association of Theoretical Chemists (CATC) Award** is presented each year at the three national undergraduate chemistry conferences for top student presentations related to computational and/or theoretical chemistry.

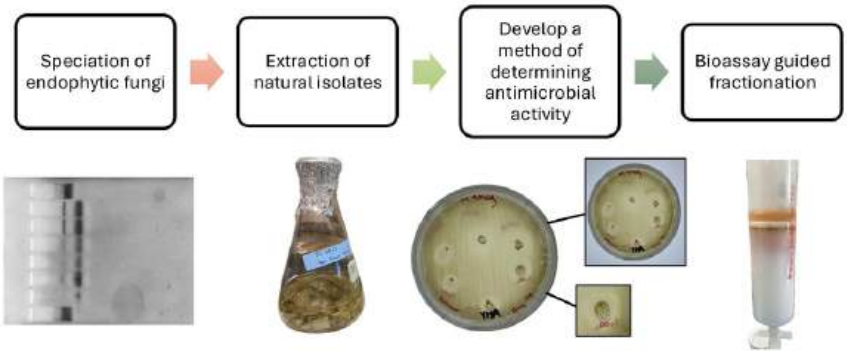
Canadian Journal of Chemistry: Best Student Presentation Award (Oral)

Noah Macpherson
Saint Mary's University

Screening and Characterization of Antibacterial Metabolites Produced by Endophytes Isolated From the Leaves of Psidium Guajava

Noah Macpherson[1], *Clarissa Sit*[1]
[1] *Saint Mary's University*

Antimicrobial resistance is an escalating global health concern that necessitates the discovery of novel antimicrobial agents. Endophytes, microorganisms that inhabit plants, are believed to be an abundant source of undiscovered antimicrobial compounds. A spot-on-lawn bioassay method was developed to screen the natural isolates of endophytes for antimicrobial activity against a variety of indicator strains. The natural isolates of two fungal and four bacterial endophytes isolated from surface-sterilized leaves of Psidium guajava were assessed for antimicrobial activity. The chloroform, ethyl acetate and methanol extracts of unidentified fungal endophyte '**G1.0**' exhibited selective inhibitory activity against Mycobacterium smegmatis ATCC 27201, a physiologically similar bacterium to Mycobacterium tuberculosis. Subsequent C18 solid-phase fractionation of the crude extracts yielded multiple active fractions. Thin-layer chromatography (TLC) was employed to optimize solvent systems, which were then applied in normal-phase chromatography to generate a series of subfractions. Ongoing work attempts to combine like fractions, characterize compounds and test refined samples for activity. LC-MS analysis of the fractions indicate that fractionation using high-performance liquid chromatography (HPLC) will be necessary to purify the active compounds.



Canadian Journal of Chemistry: Best Student Presentation Award (Poster)

Emma Cholak
Cape Breton University

A Tale of Bromine, Biochar, and the Boronic Acid That Stole Its Heart

Emma Cholak[1], *Claire McNeil*[1], *Kevin Scotland*[1], *Marzieh Baneshi*[1], *Stephanie MacQuarrie*[1]
[1] *Cape Breton University*

Woody biomass waste is a major issue in the forestry industry, contributing to greenhouse gas emissions and wasting valuable natural resources. A solution to utilize this waste is to pyrolyze it to produce biochar, which can be functionalized for uses such as carbon fixation, water purification, and catalysis. Current functionalization methods can be expensive, energy-intensive, lengthy, and produce a lot of waste. Our aim is to create a more sustainable functionalization method for biochar through carbon-carbon bond formation using Suzuki Cross-Coupling.

Our approach involves three steps: liquid-phase exfoliation of larch wood biochar to increase surface area, $FeBr_3$-catalyzed bromination, and ligand-free Pd-catalyzed cross-coupling in water at 90 °C for 6 hours. This project focused on optimizing the third step across various temperatures and times. Because biochar is a black insoluble solid, it is very difficult to characterize, so bromopyrene was used as a model compound for the optimization. The time and temperature that yielded the best results with bromopyrene were 9 for 6 hours, as characterized by ^{13}C NMR. After optimizing the cross-coupling reaction with bromopyrene, the reaction was attempted with biochar and characterized using ATR-IR, BET, TGA, and drop tests. The most visible result was ATR-IR, which showed the disappearance of C-Br stretches and the appearance of nitrile stretches after cross-coupling with a nitrile boronic ester.

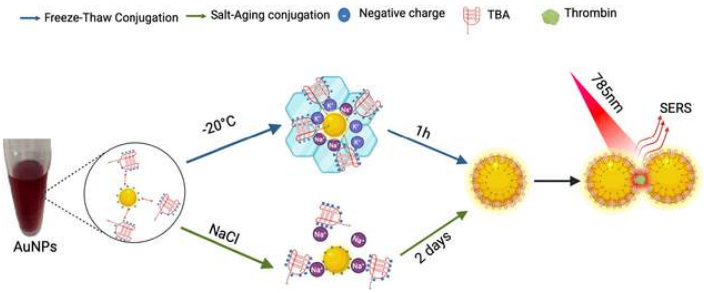
This work demonstrates a greener pathway for functionalizing biochar. Future work includes further characterization of cross-coupled biochar, expanding the boronic ester scope, and exploring uses for cross-coupled biochar.

Yvanna Tchatchoua
Mount Allison University

Toward Aptamer Based, Label-Free Detection of Thrombin Using Gold Nanoparticles and Surface Enhanced Raman Spectroscopy (SERS)

Yvanna Tchatchoua[1], *Vicki Meli*[1]
[1]*Mount Allison University*

In the biomedical field, there is an increasing demand for highly sensitive and specific biosensors, particularly for point-of-care diagnostic applications. Surface-enhanced Raman spectroscopy (SERS) has emerged as an ultrasensitive detection technique that exploits the plasmonic properties of noble metal nanostructures, such as gold nanoparticles (AuNPs). Specificity in SERS-based biosensing is achieved using biorecognition elements, including antibodies, nucleic acids and aptamers. In recent years, aptamers (short single-stranded DNA or RNA molecules) have gained significant attention due to their high specificity, stability, and ease of synthesis. In this study, thrombin-binding aptamers (TBA_{15} and TBA_{29}) were functionalized onto AuNPs to develop a label-free SERS-based biosensing platform for thrombin detection. Two functionalization strategies, salt aging and freeze-thaw methods, were investigated. The salt-aging method resulted in poor colloidal stability, as evidenced by nanoparticle aggregation. In contrast, the freeze-thaw method successfully produced stable AuNP-aptamer conjugates.TBA_{29} functionalized AuNPs exhibited distinct SERS peaks at 739, 885, 1029, 1148, 1257, and 1398 cm^{-1}, confirming successful surface attachment. However, TBA_{15} did not produce detectable SERS signals under the same conditions. Despite successful functionalization, exposure of AuNP-TBA_{29} conjugates to varying concentrations of thrombin did not result in the expected thrombin-specific SERS peaks. These findings suggest that while aptamer conjugation was achieved, the active conformation required for target binding may not have been preserved. Overall, this work provides a foundation for the development of aptamer-functionalized AuNP based biosensors and highlights key challenges in achieving both nanoparticle stability and aptamer proper folding.



CIC Best Undergraduate Presentation in Analytical Chemistry (Poster)

Amaya Giraudier
St. Francis Xavier University

Investigation of Copper-Based Catalysts for the Electroreduction of Nitrate to Ammonia

Amaya Giraudier[1], *Erwan Bertin*[1], *Brian MacLean*[1], *Craig Bennett*[2]
[1] *St. Francis Xavier University,* [2]*Acadia University*

The Haber-Bosch process is one of the most important chemical processes in use today and remains the primary method for producing ammonia—a compound essential for fertilizers, pharmaceuticals, textiles, and with potential as a hydrogen carrier. While vital to modern industry, this process consumes nearly 2% of global energy and emits around 450 million tons of CO_2 annually. Electrochemical ammonia synthesis offers a greener alternative by converting nitrate (NO_3^-) pollutants into ammonia (NH_3), simultaneously enabling sustainable ammonia production and water remediation. The electroreduction of nitrate was investigated using copper and Cu_xM_{100-x} nanoparticles (M = Ni, Fe, or Co) synthesized by pulsed laser ablation in liquids (PLAL), a surfactant-free technique that produces clean, high-surface-area catalysts through laser ablation of metal targets in liquid media. The resulting nanoparticles were characterized using transmission electron microscopy (TEM), X-ray diffraction (XRD), and microwave plasma atomic emission spectroscopy (MP-AES), and their electrocatalytic performance toward NO_3^- reduction was evaluated by cyclic voltammetry (CV) and chronoamperometry (CA). Among the catalysts studied, Cu_xCo_{100-x} alloys exhibited the highest selectivity toward ammonia. The best performance was achieved with $Cu_{50}Co_{50}$ catalysts spray-coated onto Toray carbon paper at −1.3 V vs. Ag/AgCl, reaching a Faradaic efficiency (FE) of ~90%; this catalyst was therefore examined in greater detail. Batch electrolysis optimization studies investigated the effects of applied potential, catalyst composition, catalyst loading, carbon-to-catalyst ratio, and binder content on FE for the Cu_xCo_{100-x} catalysts. Building on these optimized conditions, flow-cell electrolysis was subsequently employed to evaluate long-term operation and identify operating parameters that maximize both catalytic efficiency and durability.

CIC Best Undergraduate Presentation in Environmental Chemistry (Oral)

Marissa Cox
Cape Breton University

Analysis of Metals and Fluorescent Compounds in Aqueous Leachates of Snow Crab (*Chionoecetes opilio*) and Larch (*Larix laricina*) Biochars

Marissa Cox[1], *Stephanie MacQuarrie*[1], *Raj Kaliaperumal*[1], *Karen Foss*[1]
[1] *Cape Breton University*

Biochar is known for its many benefits and applications. Examples include the removal of pollutants from soil and wastewater, use in the agricultural sector, and benefiting the environment. Despite these benefits and the research that has been done on them, less literature exists on the risks associated with biochar. One such issue is the potential for harmful elements and organic compounds to leach from biochar when it is added to soil.

The purpose of the current study was to investigate elements and fluorescent compounds leaching from crab shell and larch wood biochars using the harsh conditions provided by accelerated solvent extraction (ASE). Elemental analysis was done using inductively coupled plasma mass spectrometry (ICP-MS) and ultraviolet fluorescence (UV-Fluorescence). Results showed relatively low elemental risk from the biochar leachates, as only three of the four larch biochar leachates had manganese levels above the acceptable limit, and crab biochar leachates had one sample marginally above the acceptable arsenic guideline. UV-Fluorescence analysis for larch wood leachates showed virtually no fluorescent compounds, while crab biochar leachates had considerable fluorescence intensities, although the identity of these compounds is unknown. The overall conclusion on the safety of the biochars is that larch biochar should be handled with caution while the manganese concentrations are investigated further, whereas crab biochar has more risk until the fluorescent compounds are identified.

CIC Best Undergraduate Presentation in Environmental Chemistry (Poster)

Olivia Mabey
Mount Allison University

A Tale of Two Cities: Contrasting Biomass-Combustion-Influenced $PM_{2.5}$ Metals at Burnaby, BC and Saint John, NB

Olivia Mabey[1], *Jenny P. S. Wong*[1]
[1] *Mount Allison University*

With climate change, wildfire smoke is becoming an increasingly important episodic source of fine particulate matter ($PM_{2.5}$) in Canada, while residential biomass heating also contributes to ambient $PM_{2.5}$ in some regions. In this study, we examined a decadal ambient $PM_{2.5}$ dataset from Burnaby, BC and Saint John, NB to compare aerosol metal chemistry between a western Canadian site more strongly affected by wildfire smoke and an eastern Canadian site where residential biomass heating may be more important.

Selected $PM_{2.5}$-associated metals were evaluated in both total and water-soluble fractions, alongside levoglucosan and K^+ as biomass-burning-associated chemical tracers. These tracers were used to identify periods of enhanced biomass-combustion influence at each site. Comparing total and water-soluble metal fractions enabled evaluation of whether biomass-burning aerosol from different combustion contexts differed in metal solubility, a property that may affect potential bioavailability and toxicological relevance.

Preliminary results show site-dependent variability in biomass-burning tracers, total metals, and water-soluble metals, as well as differences in relationships among these measurements. These patterns suggest that different biomass-combustion contexts may affect both $PM_{2.5}$ metal concentrations and solubility. This work provides insight into how biomass-combustion influences vary across Canadian environments and contribute to differences in aerosol metal chemistry and associated exposures.

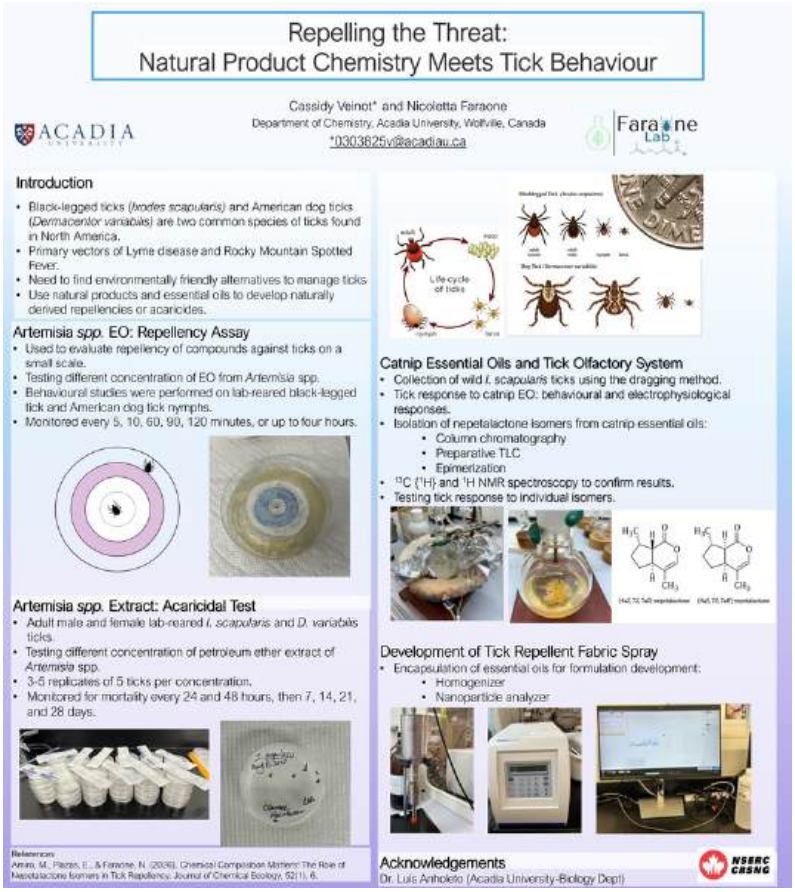
CIC Best Undergraduate Presentation in Environmental Chemistry (Poster)

Cassidy Veinot
Acadia University

Repelling the Threat: Natural Product Chemistry Meets Tick Behaviour

Cassidy Veinot[1], *Nicoletta Faraone*[1]
[1]*Acadia University*

The increasing prevalence of tick-borne illnesses in North America, specifically Lyme disease and Rocky Mountain Spotted Fever, necessitates the development of effective pest management strategies. Black-legged ticks (*Ixodes scapularis*) and American dog ticks (*Dermacentor variabilis*) are two common species of ticks found in North America that vector these diseases. While synthetic chemical repellents are widely available, there is a growing demand for environmentally friendly alternatives. This research investigates naturally derived repellencies and acaricides using essential oils. This research contributes to the creation of sustainable solutions against tick-borne pathogens.



CIC Best Undergraduate Presentation in Inorganic Chemistry (Oral)

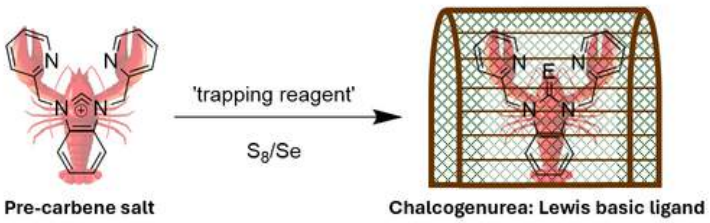
Evan Spencer
Saint Mary's University

Carbene Trapping and Complexation: Novel Thiourea and Selenourea Ligands Derived From 1,3-Bis(2-pyridylmethyl) Benzimidazolium Salts

Evan Spencer[1], *Liah Christie*[2], *Robert Singer*[1]
[1] *Saint Mary's University,* [2]*University of Victoria*

N-Heterocyclic carbenes (NHCs) have gained significant interest throughout the literature due to their versatile steric and electronic properties which allow them to form very stable complexes. Such complexes are of interest as they have been shown to be effective as catalysts. Within our group the carbene precursor 1,3-bis(2-pyridylmethyl)benzimidazolium salts are of interest due to their ability to form NCN pincer complexes as has been shown previously within our group[1]. Attempts to isolate the free carbene of these salts have been unsuccessful. Due to this, the heavier chalcogens, sulfur and selenium have been used as carbene trapping reagents to probe the formation of the carbene in situ, resulting in the formation of novel thiourea and selenourea compounds. Although initially synthesised as a probe, the resulting compounds are soft Lewis bases making them effective as ligands for late transition metals such as copper, silver and gold. The synthesis and applications of these ligands and their complexes will be discussed.

1. (a) Organometallics 2017, 36 (17), 3175-3177; (b) Can. J. Chem. 2024 102: 201-205



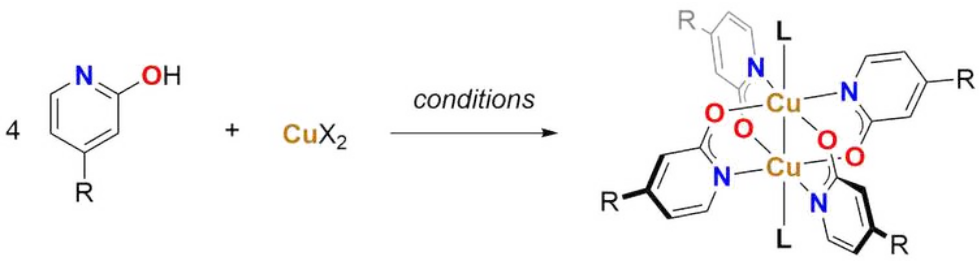
CIC Best Undergraduate Presentation in Inorganic Chemistry (Poster)

David Jay
Mount Allison University

Copper(II) Pyridonate Paddlewheel Complexes as Precursors for Metal-Organic Frameworks

David Jay[1], *Samuel Griffin*[1]
[1] *Mount Allison University*

Metal-organic frameworks (MOFs) are a class of porous materials that are formed by metal clusters or ions, called secondary building units (SBUs), connected by organic linker molecules. The high porosity and internal surface area of the resulting structures gives MOFs utility as finely-tunable nano-sized reaction vessels, catalysts, and gas (*e.g.*, carbon dioxide) capture/storage materials, among other applications. Most MOFs reported to date utilize carboxylate (1,3-*O,O*-chelating) linkers. Prevalent among these are MOFs constructed from copper(II) paddlewheel SBUs. However, analogous 1,3-*N,O*-chelating linkers, such as amides or pyridonates, have remained largely unexplored in the synthesis of MOF materials, although a small number of examples have been reported. Notably, previous work on 1,3-*N,O*-chelated paddlewheel compounds suggests that incorporating these motifs into MOFs as SBUs may produce MOFs that are more stable under basic conditions compared to their 1,3-*O,O*-chelated counterparts. Thus, the aim of this work was to synthesize copper(II) paddlewheels with pyridonate ligands as precursors to new MOFs (Figure 1). An important consideration in traditional MOF synthesis is ensuring that the SBU precursors and linkers are dissolved prior to solvothermal synthesis. Therefore, it is imperative that any copper(II) pyridonate precursor is soluble in common solvents. To this end, several pyridonate complexes were synthesized by one of two synthetic approaches: 1) salt metathesis or 2) protonolysis. By tuning the properties of the pyridonate proligand, it was found that one paddlewheel complex in particular was highly soluble in several common solvents and could be reliably synthesized in good yield. This SBU precursor was characterized by IR and NMR spectroscopy and single-crystal X-ray diffraction studies. Critically, this SBU precursor could facilitate the synthesis of a new class of MOFs with 1,3-*N,O*-chelating linkers that may exhibit improved stability under conditions relevant to industrial applications.



CIC Best Undergraduate Presentation in Macromolecular and Polymer Chemistry

Laura Powell
Memorial University of Newfoundland

Functional Polymers From Sulfur Nanoparticles

Laura Powell[1], Cody King-Poole[1], Wei Wei[1], Héloïse Thérien-Aubin[1]
[1]Memorial University of Newfoundland

Elemental sulfur is a major byproduct of the petroleum industry with massive reserves that remain underused. Using sulfur as a feedstock to create new materials is therefore an economically and environmentally compelling form of waste valorization. Sulfur-rich materials also have promising intrinsic physiochemical properties.

We developed a new method to convert elemental sulfur into functional sulfur-rich polymer nanoparticles. Compared to standard inverse vulcanization methods, our systems are easy to process with miniemulsion. Reaction occurs at lower temperatures and accommodates additional comonomers and functionalities. Our synthesis also facilitates high sulfur conversion and inclusion in the final polymers. The resulting sulfur-rich polymers are durable and chemically robust, with dynamic covalent bonds that allow for self-healing.

One application of sulfur-rich polymers studied is their use as high-performance marine coatings. Current marine coatings continue to use harsh organic solvents. Our polymer is alternatively processed as a water-based latex. Additionally, sulfur-rich materials have high metal affinity. Nanoparticle polymer formulation increases these surface interactions, enhancing coating adhesion, strength, and uniformity. Sulfur-rich materials furthermore display anticorrosive and antifouling properties.

An additional application under investigation is the use of functionalized sulfur polymers as a cement additive. These polymers can provide acid resistance against harsh environmental conditions, such as acid rain, that pose issues to concrete structures. The polymer additive simultaneously increases concrete's compressive strength, enhancing structural integrity.

This work demonstrates that an abundant industrial waste can be transformed with near-quantitative efficiency into sulfur-rich polymers. The resulting materials combine sustainability, durability, and versatile functionality, offering an exciting platform for demanding real-world applications.

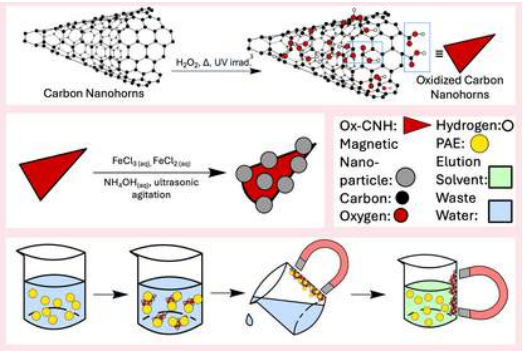
Madison Power
Cape Breton University

Development of Oxidized Magnetic Single-Walled Carbon Nanohorn Adsorbents for Magnetic Dispersive Solid-Phase Extraction of Phthalates in Wastewater Systems

Madison Power[1], *Allen Britten*[1], *Martin Mkandawire*[1]
[1] *Cape Breton University*

Phthalic acid esters, commonly known as phthalates, are plasticizing chemicals used to increase the flexibility, durability, and transparency of plastics such as polyvinyl chloride (PVC), commonly found in cosmetics, cleaning supplies, tubing, and medical equipment. Despite their industrial utility and low cost, phthalates are pervasive environmental pollutants, particularly in aquatic ecosystems. They are classified as endocrine-disrupting chemicals and have been shown to impair photosynthetic activity in aquatic flora by reducing pigment content, exhibit acute toxicity toward freshwater and marine organisms, and cause birth defects, hormone disruptions, and cancers in humans. One of the most prevalent phthalates, DEHP, is regulated at 8-10 µg/L in drinking water, with safe exposure limits established at 310 µg/day. The detection and quantification of phthalates in environmental samples present significant analytical challenges due to their low concentrations, broad polarity range, susceptibility to contamination during analysis, and frequent reliance on high volumes of organic solvents. To address these limitations, this study aims to develop a sensitive, selective, and more environmentally friendly extraction method for the detection of high-risk phthalates in Cape Breton wastewater systems. Wastewater systems were selected because they serve as a major collection point for industrial, domestic, and pharmaceutical waste, making them critical pathways for phthalate release into the environment.

This study proposes the use of magnetic-dispersive solid phase extraction (MDSPE) employing magnetized, oxidized single-walled carbon nanohorns (MOCNHs) as an adsorbent to remove phthalic acid esters (phthalates) from water samples. The carbon nanohorns are oxidized through UV irradiation and magnetized through the in-situ synthesis of magnetite nanoparticles. Phthalates adsorb to the carbon nanohorn surface, allowing the MOCNHs to be magnetically separated from the sample following analyte elution. After extraction, analytes are quantified using gas chromatography coupled with mass spectrometry (GC-MS), selected for its high sensitivity, strong resolution, cost-effectiveness, and suitability for complex environmental matrices containing trace-level contaminants. To evaluate material properties, the magnetic nanoparticles and MOCNHs are characterized using Fourier-transform infrared spectroscopy, X-ray diffraction, and transmission electron microscopy. The MDSPE-GC-MS procedure is anticipated to provide a robust, efficient, and environmentally responsible alternative to conventional extraction methods such as solid-phase and liquid-liquid extraction, which often require high solvent consumption through multiple elution steps and increase contamination risk.



Adalia Wambolt
St. Francis Xavier University

Investigation of Casein Gold Nanocluster Bioconjugates as Allergen Immunotherapeutic Agents

Adalia Wambolt[1], Victor Martinez-Macias[1], Brian Foo[1], Geniece L. Hallett-Tapley[1], Alexander C. Y. Foo[1]
[1] St. Francis Xavier University

Food allergies are one of the most common illnesses in the world, and yet there is no real cure or a full understanding of how they work. Food allergies are the result of the immune system attacking misidentified proteins called allergens. These allergens are proteins contained within a food that the immune system mistakenly labels as harmful; this can result in anaphylaxis. Recent attempts to correct the immune system involve using chemically modified “hypoallergenic” allergens which can evade the immune system and bypass any possible anaphylactic response. After passing through the immune system’s defenses, these hypoallergens can be released back in their native form. One promising strategy to produce these hypoallergens is gold nanoclusters (AuNC). Protein-conjugated Gold Nanoclusters (AuNC) are an emerging material with extensive applications in medicine and biotechnology. Recent work on egg allergens shows that AuNC bioconjugation can disrupt the structure of the bound allergen, preventing its recognition by the human immune system. This project aimed to study the versatility of this technique using a milk protein called casein, an intrinsically unstructured protein. Previous works describe the use of casein proteins from bovine milk as a facile and economical scaffold for the generation of AuNC bioconjugates. We observed successful formation of the casein AuNC bioconjugates, which showed reduced immunogenicity. However, we also observed significant hydrolysis of the casein scaffold, suggesting they would better be labelled casein-AuNC hydrolysates. This hydrolysis of the casein scaffold eliminates the potential for hypoallergen formation. Despite the inability of the casein-AuNC hydrolysates to serve as hypoallergens, they maintain their biosensing abilities while displaying reduced immunogenicity. Additional studies could investigate the long-term stability of the casein-AuNC hydrolysates and their potential biosensing uses in a biological setting.

CIC Best Undergraduate Presentation in Organic Chemistry (Oral)

Jacek Marmulak
Cape Breton University

Taming Thiourea: An Immobilized Catalyst for the Morita-Baylis-Hillman Reaction

Jacek Marmulak[1], Stephanie MacQuarrie[1], Kevin Scotland[1], Andrew Carrier[1]
[1]Cape Breton University

The Morita-Baylis-Hillman reaction is of significant interest in organic synthesis due to its ability to produce dense multi-functionalized products. However, this reaction is inherently slow, and a co-catalyst is often required to enhance its practicality. Thiourea is a known co-catalyst, and immobilizing it on a solid support improves handling safety and facilitates recovery. Larch wood biochar was investigated as a renewable catalyst support due to its sustainability, high surface area and porosity, and available surface functional groups. A thiourea-silane was synthesized to functionalize biochar through condensation reactions. The resulting heterogeneous catalyst achieved conversions of up to 100%. Additionally, the catalyst was found to be recyclable for use in up to three reactions. These results demonstrate that biochar is a promising green support for heterogeneous catalysis and can be successfully used to catalyze the Morita-Baylis-Hillman reaction.

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Chemistry Education Division
Environmental Chemistry Division
Inorganic Chemistry Division
Macromolecular Science and Engineering Division
Materials Chemistry Division
Organic Chemistry Division
Physical, Theoretical and Computational Chemistry Division
Surface Science Division

CIC Best Undergraduate Presentation in Organic Chemistry (Poster)

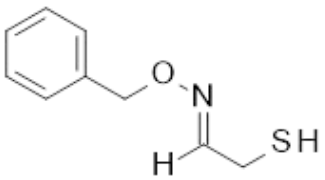
Ainaz Giahi
Mount Allison University

A Novel O-Enabled S/N Bidentate Ligand

Ainaz Giahi[1], *Andrew Grant*[1]
[1] *Mount Allison University*

This Presentation describes the discovery, selective synthesis, and characterization of a novel open-chain, O-enabled S/N bidentate ligand, which emerged unexpectedly during an attempt to synthesize an *α*-bicyclic dithiane. Through the utilization of *O*-benzylhydroxylamine - an oxyamine, exploiting the *α*-effect - and optimized dilute reaction conditions in dichloromethane, the typical cyclization pathway leading to the bicyclic dithiane was suppressed, allowing for the selective isolation of the open-chain architecture.

1H NMR and 2D COSY are presented. Mechanistic analysis suggests that the adjacent oxygen atom electronically deactivates the imine carbon, shifting the reaction from thermodynamic control favoring bicyclic product formation to a kinetically controlled pathway that yields the ligand.



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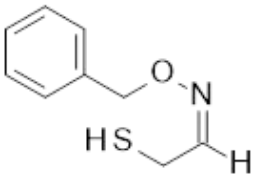


cis

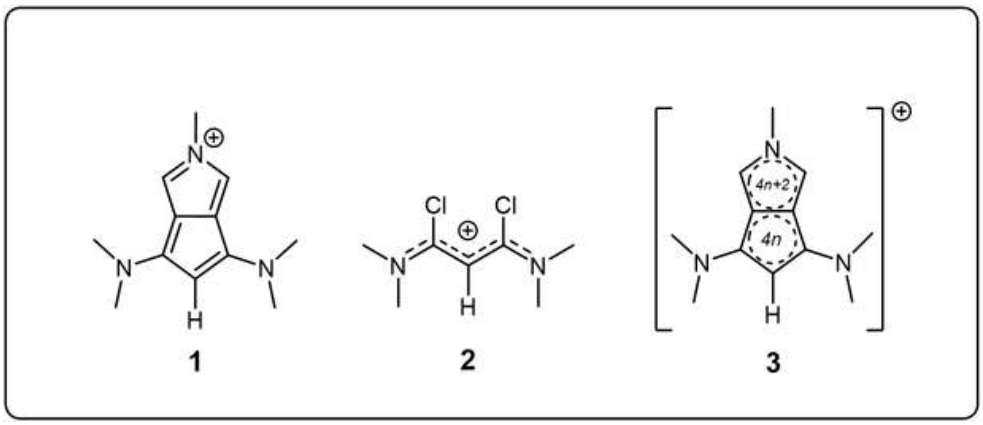
CIC Best Undergraduate Presentation in Physical, Theoretical and Computational Chemistry (Oral)

George Lawless
Saint Mary's University

Chemistry of 1,3-Dichloro-1,3-bis(dimethylamino)propenium Cations: Detection and Characterization of an Azapentalenium Cation

George Lawless[1], *Jason Clyburne*[1]
[1] *Saint Mary's University*

A 1,3-bis(dimethylamino)-4-azapentalenium cation (**1**) was identified as a minor byproduct during syntheses using 1,3-dihalopropenium ions (**2**) in the presence of organic bases. The structural and electronic characteristics of 1 were explored through Ultraviolet-Visible spectroscopy and mass spectrometry. Computational studies were performed on **1** using Nucleus Independent Chemical Shift calculations. Results suggest that the 1,3-bis(dimethylamino)-4-azapentalenium cation is best described as a species containing an aromatic ring and an antiaromatic ring, seen in **3**.



CIC Best Undergraduate Presentation in Physical, Theoretical and Computational Chemistry (Poster)

Sydney Lewis
Saint Mary's University

Investigating the Ultrastructure of Banana Starch During Ripening Using Polarization-Resolved Second Harmonic Generation Microscopy

Sydney Lewis[1], *Richard Cisek*[1], *Danielle Tokarz*[1]
[1] *Saint Mary's University*

Starch is an important biomaterial widely used in the food industry, as well as in pharmaceuticals, textiles, and adhesives. Banana starch, present in high quantities in unripe bananas, has gained recent attention as a potential alternative source of starch due to the widespread availability and distribution of bananas; however, the structural changes during starch-to-sucrose transformation remain poorly characterized. Polarization-resolved second harmonic generation (PSHG) microscopy is a useful and sensitive imaging technique that reveals microscopic structural details about the organization of SHG-emitting molecules, present in starch granules. The changes in the ultrastructure of starch granules isolated from bananas at different ripeness stages were investigated using PSHG microscopy. PSHG imaging was performed using a custom-built laser scanning microscope coupled to an ultrafast 290 fs laser with a 1030 nm excitation wavelength and 5 MHz repetition rate. For starch granules with lengths between 20 to 29 µm, the PSHG parameter ρ was found to display a statistically significant decrease with increasing ripeness at the 95% confidence level, which may indicate that the semicrystalline organization of amylopectin double helices become more disorganized on a molecular or macromolecular scale during ripening. This observation is in line with the literature, which shows that crystallinity decreases as bananas ripen. Images obtained for all granules revealed characteristic SHG features of starch, including a loss of signal at the hilum due to the centrosymmetric arrangement of emitters in opposite directions, as well as distinct radial grooves. This work further established that SHG microscopy can be used as a useful, non-destructive, and label-free technique for the investigation of banana starch.

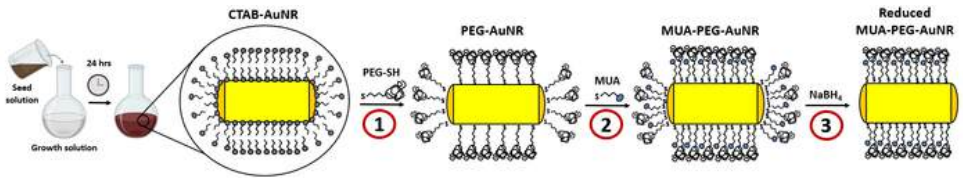
CIC Best Undergraduate Presentation in Surface Science

Cynthia McNair
Mount Allison University

Towards Regioselective Ligand Exchange on Surfaces of Gold Nanorods

Cynthia McNair[1], *M.-Vicki Meli*[1]
[1] *Mount Allison University*

Regioselective functionalization of gold nanorods (AuNRs) has been shown to enable control over nanorod self-assembly, allowing the formation of superstructures and interfacial films used in plasmonics, metamaterials, sensing, and catalysis. A study by Fisher et al. demonstrated electrochemically-controlled and selective ligand removal of 11-mercaptoundecanoic acid (MUA) from the Au (111) over Au (100) facets of a gold bead electrode. In this study, we apply this method toward the regioselective functionalization of gold nanorods (AuNRs) in solution. Our approach entails synthesizing cetyltrimethylammonium bromide-functionalized nanorods (CTAB-AuNRs), exchanging CTAB for carboxylic acid-terminated polyethylene glycol thiol (COOH-PEG-SH) and backfilling with 11-mercaptoundecanoic acid (MUA). Reductive desorption of the thiol groups at the Au(111) surfaces at the ends of the AuNRs by careful addition of sodium borohydride was monitored via measurements of the open circuit potential and concurrent UV-visible spectroscopy tracking of the localised surface plasmon resonance (LSPR) peaks associated with the AuNRs. This work establishes a methodology in the trajectory for selective desorption, which can be further confirmed by addition of terphenyl-4,4-dithiol (TPD) using surface-enhanced Raman spectroscopy (SERS).



Adam Lynch
Dalhousie University

Sequence-Dependent Ionization and Fragmentation Explain the Prevalence of Missed-Cleavage Peptides in Proteomics

Adam Lynch[1], *Alan Doucette*[1], *Tiana Sharpe*[1], *Carlie Charron*[1]
[1] *Dalhousie University*

Trypsin is the dominant protease used in bottom-up proteomics; however, peptides containing missed cleavages are routinely detected in liquid chromatography-tandem mass spectrometry (LC-MS/MS) datasets, even under optimized and extended digestion conditions. Previous studies have largely attributed missed cleavages to unfavorable digestion kinetics caused by acidic residues or adjacent basic residues, yet the analytical consequences of these sequence motifs for mass spectrometric detection remain poorly understood.

To investigate this, synthetic peptides containing varying numbers and types of basic residues were used to systematically evaluate the influence of sequence composition on peptide ionization efficiency and fragmentation behavior. Trypsin digested products were quantified using reversed-phase liquid chromatography with ultraviolet absorbance detection and subsequently analyzed by LC-MS/MS. Data was processed using the MaxQuant search engine to assess relative ionization efficiencies and fragmentation characteristics of lysine- and arginine-containing peptides in both digested and non-digested forms.

The results demonstrate that peptides containing multiple basic residues exhibit enhanced ionization and improved fragmentation, leading to increased detectability by LC-MS/MS. These findings suggest that missed cleavage peptides are not solely a consequence of incomplete digestion but may also be preferentially identified due to favorable mass spectrometric properties. This provides new insight into their prevalence in tryptic proteomic datasets.

CIC Best Graduate Presentation in Analytical Chemistry (Poster)

Jenna Berryman
Saint Mary's University

Aptamer-Based Assays for Biomarker Detection in Urine for Muscle Health Monitoring

Jenna Berryman[1], Christa Brosseau[1], Rafaela Andrade[2]
[1]Saint Mary's University, [2]Myomar Molecular Inc.

Skeletal muscle health is essential for mobility, metabolic function, and overall quality of life. Age-related muscle loss, or sarcopenia, is associated with increased risk of falls, frailty, metabolic disorders, and mortality. Despite its clinical importance, routine monitoring of muscle health remains limited due to reliance on expensive, specialized and often inaccessible assessment methods. There is a clear need for simple, non-invasive approaches that enable more accessible and frequent monitoring. This work explores the development of an aptamer-based platform for detecting 'biomarker X' as a potential indicator of muscle health. Aptamers offer high specificity and affinity for their targets, making them well-suited for biosensing applications. A fluorescence-based strategy was used to evaluate target recognition, alongside the development of a complementary lateral flow assay for rapid, visual detection. Overall, this work highlights the potential of aptamer-based sensing strategies for developing accessible, point-of-care (POC) tools for monitoring muscle health. These approaches may support earlier detection and improved management of conditions such as sarcopenia through more routine and non-invasive testing.

Deana Symes
Saint Mary's University

Heavy Group 15 Carbene-Stabilized Neutral Radicals

Jason Masuda[1], *Deana Symes*[1]
[1] *Saint Mary's University*

Radical species contain an unpaired electron and are known for their intrinsic high reactivity. Methods to stabilize radicals generally involve the introduction of conjugated systems and sterically hindering environments. The incorporation of singlet carbenes, particularly N-heterocyclic carbenes (NHCs) and cyclic(alkyl)(amino) carbenes (CAACs), has been shown to enable the generation, and in some cases, the isolation of radical-containing species, which otherwise could not be detected spectroscopically.[1] For dipnictogen-centered carbene-stabilized radicals, neutral dinitrogen[2] and diphosphorus[3] centered radicals have been reported for Carbene-Pn-Pn-Ar systems (Pn = pnictogen, Ar = aryl); however, neutral mixed pnictogen analogues remain unexplored in this context.

In this work, a series of [ArNP(Carbene)][OTf] salts was prepared, utilizing carbenes with varying π-accepting properties and subsequently reduced to generate radicals with differing stability. To probe the influence of the substituent arrangement on the radical stabilization, the positions of the aryl group and carbene were interchanged to access the Carbene=NP-Ar framework. Within this framework, 1-phosphaindane derivatives were also investigated to expand our understanding of this system. Finally, an extension of this work to the heavier Group 15 congeners was pursued, using the general framework: Carbene=NPn-Ar (Pn = Sb, Bi). Computational analysis of the radicals in both frameworks revealed key differences in the electronic structures and stabilization.

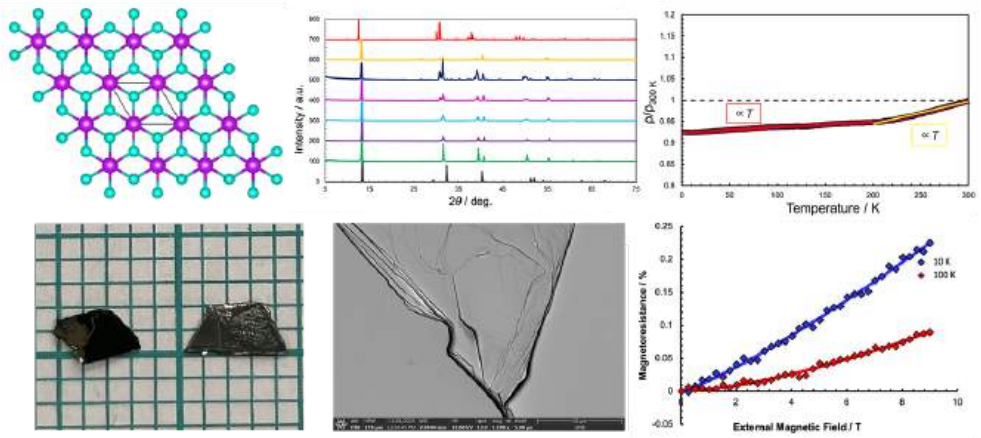
(1) D. Martin, C.; Soleilhavoup, M.; Bertrand, G. Carbene-Stabilized Main Group Radicals and Radical Ions. *Chemical Science* **2013**, *4* (8), 3020-3030. https://doi.org/10.1039/C3SC51174J.
(2) Eymann, L. Y. M.; Tskhovrebov, A. G.; Sienkiewicz, A.; Bila, J. L.; Živković, I.; Rønnow, H. M.; Wodrich, M. D.; Vannay, L.; Corminboeuf, C.; Pattison, P.; Solari, E.; Scopelliti, R.; Severin, K. Neutral Aminyl Radicals Derived from Azoimidazolium Dyes. *J. Am. Chem. Soc.* **2016**, *138* (46), 15126-15129. https://doi.org/10.1021/jacs.6b09124.
(3) Haberstroh, J.; Taube, C.; Fidelius, J.; Schulz, S.; Israel, N.; Dmitrieva, E.; Gomila, R. M.; Frontera, A.; Wolf, R.; Schwedtmann, K.; Weigand, J. J. A Neutral Diphosphene Radical: Synthesis, Electronic Structure and White Phosphorus Activation. *Chem. Commun.* **2024**, *60* (65), 8537-8540. https://doi.org/10.1039/D4CC02200A.

Emily Doucet
University of New Brunswick, Fredericton

Composition-Structure-Property Relationship of Tellurium-Rich TaTexSe2-x Single Crystals

Emily Doucet[1], *Jan Pohls*[1]
[1] *University of New Brunswick, Fredericton*

Tantalum dichalcogenides in the binary Ta-Se and Ta-Te systems have been widely studied due to their composition-dependent crystal structures and unusual electronic behaviour, including charge-density-wave ordering and superconductivity. In contrast, ternary compositions in the $TaTe_xSe_{2-x}$ system remain comparatively underexplored, particularly in the tellurium-rich regime near $TaTe_2$. In this work, tellurium-rich $TaTe_xSe_{2-x}$ ($1.4 \leq x \leq 1.9$) compositions were synthesized in both polycrystalline and single-crystalline forms to investigate the composition-dependent structural and electronic properties. Structural characterization was performed using powder X-ray diffraction, scanning electron microscopy, and energy dispersive X-ray, while temperature - and field-dependent transport measurements were carried out between 2 and 300 K. Density functional theory calculations were used to complement the experimental results. This work aims to clarify composition-structure-property relationships in tellurium-rich $TaTe_xSe_{2-x}$, providing a foundation for the design of next-generation electronic and quantum materials.

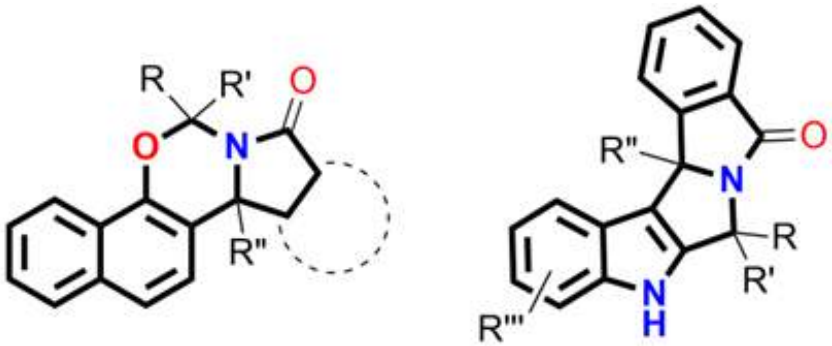


Scott Robinson
Acadia University

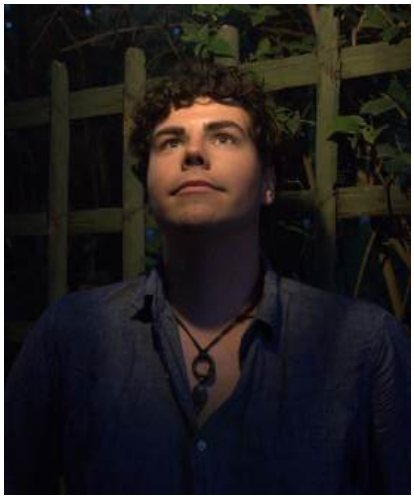
Assembling Complex Polyheterocycles Using N-Acyliminium Ion Chemistry

Amitabh Jha[1], *Scott Robinson*[1]
[1]*Acadia University*

N-Acyliminium ions are highly electrophilic, in-situ-generated cationic intermediates defined by a positively charged nitrogen adjacent to a carbonyl group, which greatly enhances their reactivity compared to simple iminium ions. They exhibit mesomeric charge distribution between nitrogen and the α-carbon, a feature that underlies their strong tendency to form new carbon-carbon and carbon-heteroatom bonds. Their instability and transient nature mean they are rarely isolated and are instead produced from stable precursors under acidic or Lewis-acidic conditions. These ions participate in highly stereoselective reactions, where conformational preferences of cyclic *N*-acyliminium species can dictate facial selectivity in nucleophilic additions. Because of their broad nucleophile compatibility and enhanced electrophilicity, they serve as powerful intermediates for constructing nitrogen-containing heterocycles, including alkaloid-like frameworks. Consequently, N-acyliminium ions are widely used in the synthesis of complex polyheterocyclic molecules, enabling efficient assembly of diverse polycyclic and bridged ring systems. We envisage using this strategy in producing complex polyheterocycles of medicinal relevance having framework such as aza-oxa-heterosteroids and indole/isoindole fused alkaloid analogs. Results obtained thus far will be presented.



CIC Best Graduate Presentation in Physical, Theoretical, and Computational Chemistry

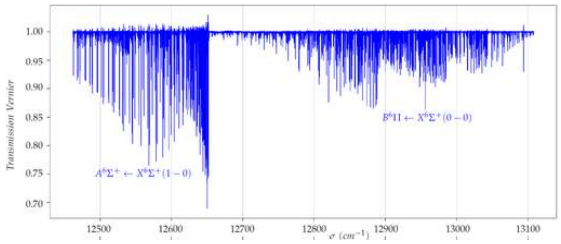


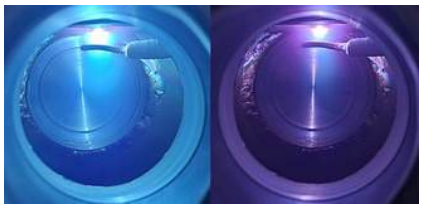
Lucas Michaud-Chevalier
University of New Brunswick, Fredericton

Progress in Vernier Spectroscopy for High Resolution Study of Chromium Deuteride B6Π ← X6Σ+(0 − 0) and A6Σ+ ← X6Σ+ (1 − 0) Bands

Lucas Michaud-Chevalier[1,2], *Jerome Morville*[2]
[1] *University of New Brunswick, Fredericton,* [2] *Lyon 1 University*

The existence of metal hydrides in the atmospheres of brown and red dwarfs and hot exoplanets makes them ideal spectral markers for the astrophysics community. The spectral study of CrH by A. Ross, J. Morville, P. Crozet, and A. Genoud at the Institut Lumière Matière (Lyon 1 University, France) has led to experimental observation of the B6Π electronic state calculated by S. Koseki et al. The spectral superposition of the CrH vibronic transitions B6Π ← X6Σ+(0 − 0) and A6Σ+ ← X6Σ+(1 − 0) required the study of the isotopologue CrD, to disentangle them. The study has been carried out using a broadband frequency comb coupled with a high-finesse cavity: the Vernier spectrometer. We present new advances in understanding the innovative optical device of Vernier spectrometer, including presentation of the process required for calibration and obtaining absorption spectra. We describe the hollow cathode discharge used to produce metal hydrides within the Vernier spectrometer. Finally, we present a new spectrum of CrD between 12462 cm−1 and 13107 cm−1 which show the B6Π ← X6Σ+(0−0) system spectrally separated from A6Σ+ ← X6Σ+(1 − 0).





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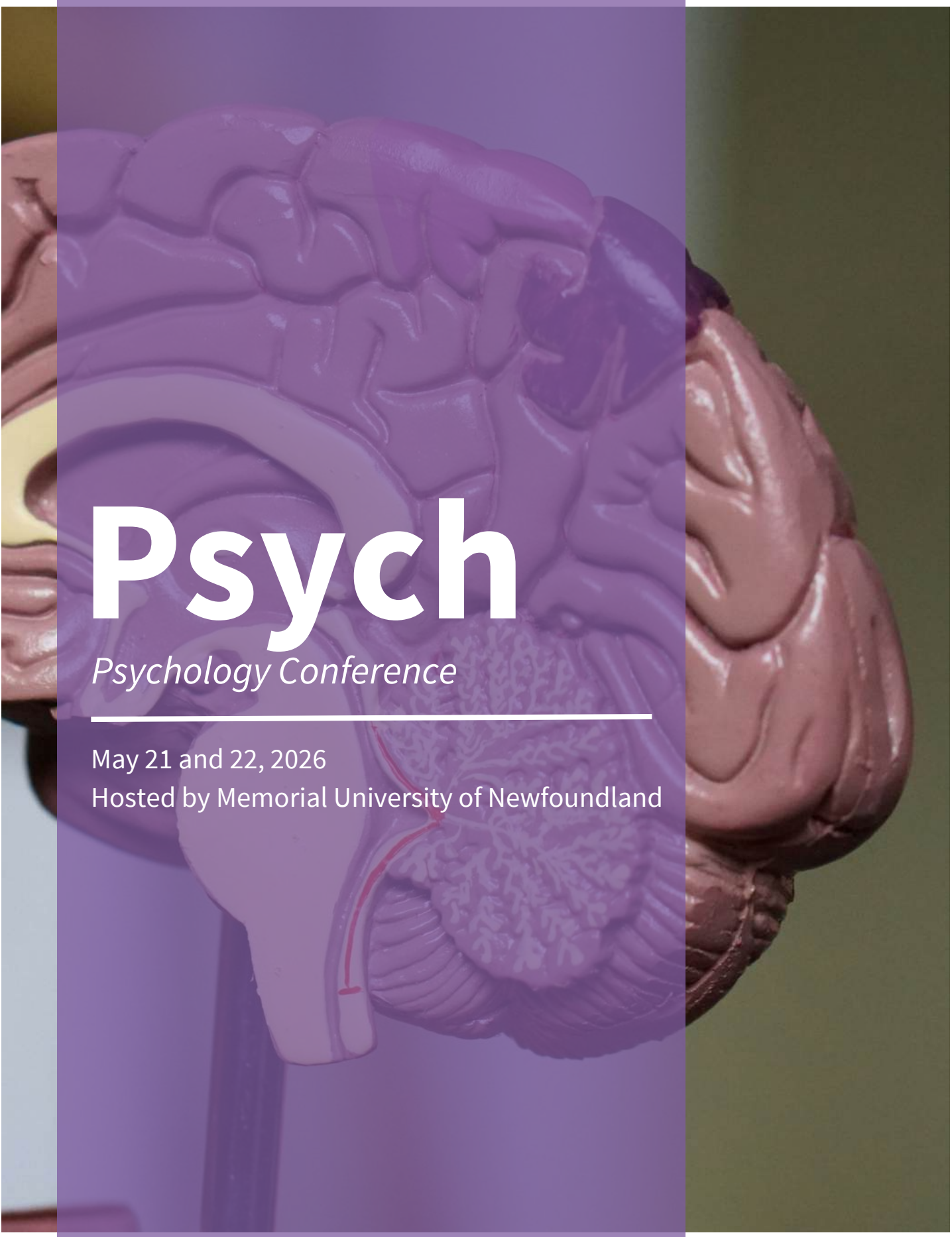

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Krista Gardner
Memorial University of Newfoundland, Grenfell Campus

Comparing the Impacts of Yin-Inspired Restorative and Hatha Yogas on Perceived Stress, Sleep Quality, and Cognitive Function

Krista Gardner[1]
[1]*Memorial University of Newfoundland, Grenfell Campus*
Supervisor: Peter Stewart

Recent research has shown that practicing yoga seems to produce benefits across a number of domains including perceived stress levels, sleep quality, and cognition. However, attempts to compare various forms of yoga (e.g., Hatha, Yin, and Restorative yogas) for any specific differential benefits have produced largely inconclusive findings. In a repeated measures design (i.e., 4 weekly yoga sessions) and using simple, novel assessment tools, this study compared two yoga groups (i.e., a Hatha group - an active form of yoga which flows through poses in standing, seated, and supine poses; and a Yin-Influenced Restorative group - a passive form of yoga in which participants hold poses for 3-7 minutes) on levels of perceived stress, overall sleep quality, and working memory. Significant improvements across all dependent variables were observed for both groups, with these changes being experienced at similar rates. Thus, participants engaging in an active form of yoga, like Hatha, experience the same benefits in perceived stress reduction, better overall sleep quality, and improved working memory as those who practice passive forms of yoga, like Yin and Restorative. These results have potential implications for specific populations such as older adults and/or those with mobility or cognitive impairments. Avenues for future research is discussed.

Science Atlantic Undergraduate Research Award

Steven Nzoyamara
Memorial University of Newfoundland

The Impact of Subliminal Distraction on Representations in Visual Working Memory

Steven Nzoyamara[1], R. Miller[1], Blaire Dube[1]
[1]Memorial University of Newfoundland
Supervisor: Blaire Dube

This project explores whether subliminally presented stimuli (i.e., those we are not consciously aware of) affect the things we are currently holding in memory. Previous studies have shown that consciously presented visual distractors can distort currently held representations in visual working memory (VWM), causing remembered features to blend together with distractors—an effect known as attractive bias. Using a computerized memory task with delay-period distractors presented for variable durations (including 12ms; below the threshold for conscious awareness), the present study suggests that even those distractors presented subliminally can produce attractive bias in a concurrently maintained item in VWM.

Information on the **Science Atlantic Undergraduate Research Award** and the **Science Atlantic Science Communication Award** can be found on page 13 of the Yearbook.

Mehar Sharma
Mount Saint Vincent University

Echoes of Trauma: Effects of Childhood and Lifetime Trauma on Vocal Outcomes

Mehar Sharma [1]
[1] *Mount Saint Vincent University*
Supervisor: Angie Birt

This study examined whether childhood and lifetime trauma are associated with voice-related quality of life and stress-linked voice responses in adults. Building on preliminary work, we tested whether specific forms of childhood trauma and broader lifetime trauma exposure would differentially predict voice outcomes. Participants were 152 adults (M_{age} = 25; 77.4% female; 64.9% White) from a screening survey who completed self-report measures of childhood trauma, lifetime trauma exposure, voice-related quality of life, and questions about stress-linked voice responses. A stress-linked voice response index was created combining three items assessing voice changes when upset, tension in the neck or throat, and temporary voice loss or vocal strain after stress. Replicating and extending previous findings, greater childhood trauma was associated with poorer voice-related quality of life. Across multivariable models, childhood emotional abuse was identified as the most consistent unique predictor of poorer overall voice-related quality of life and poorer vocal physical-functioning scores. For the social-emotional aspect of vocal functioning, both emotional abuse and physical neglect were significant unique predictors. Adding lifetime traumatic experiences did not meaningfully improve prediction of voice-related quality of life. In contrast, the stress-linked voice response index showed a somewhat different pattern: childhood emotional abuse remained a significant unique predictor, and lifetime sexual trauma exposure also accounted for unique variance. These findings suggest that childhood emotional abuse may be especially relevant to both general voice-related difficulties and stress-linked voice responding, while lifetime sexual trauma may be more specifically associated with acute stress-related voice effects.

Dylan Martin
Saint Mary's University

Awe, Beauty, and Meaning in Life

Dylan Martin[1], *Marc Patry*[1]
[1] *Saint Mary's University*
Supervisor: Marc Patry

This study examined the relationship between awe, perceived beauty, and meaning in life using a three-condition between-subjects experiment. Despite widespread theoretical claims that awe is a "meaning-making emotion," empirical support remains sparse and methodologically limited. The present study addressed this gap using validated, multidimensional measures of both awe and meaning in life. Ninety participants were randomly assigned to view one of three videos: a nature documentary of Yosemite National Park (positive awe), a National Geographic tornado clip (negative awe), or a workplace safety video (neutral control). Following exposure, participants completed a two-item experienced-beauty measure, the Awe Experience Scale (AWE-S; Yaden et al., 2019), and the Multidimensional Existential Meaning Scale (MEMS; George & Park, 2017). The awe induction was highly successful ($\eta^2 = .43$), and beauty ratings differed significantly across all three conditions ($\eta^2 = .62$). However, awe condition had no significant effect on MEMS total scores or any subscale ($\eta^2 = .02$), and awe and meaning in life were essentially uncorrelated at the individual level ($r = -.01$). Notably, the two awe conditions produced equivalent awe scores yet differed significantly on beauty ratings, providing novel empirical support for a distinction between aesthetic and threat-based awe. These findings challenge claims that awe reliably promotes meaning in life and suggest that prior positive findings may reflect dispositional confounds or weak measurement. Future research should employ stronger inductions and longitudinal designs to clarify this relationship.

Kiley Rowsell
St. Francis Xavier University

Empowered Encounters: Self Advocacy and Sexual Autonomy in University Campus Hookup Culture

Kiley Rowsell[1], *Elvira Prusaczyk*[1]
[1] *St. Francis Xavier University*
Supervisor: Elvira Prusaczyk

University hookup culture is a well-established part of undergraduate life, yet many students begin university with little preparation, mixed peer messages, and uneven understandings of consent, boundaries, and emotional safety. Early experiences in this culture shape students' well-being, agency, and confidence in navigating intimate relationships, but campus resources often provide only broad consent education rather than practical, student-informed guidance on navigating hookup culture. This study addressed that gap by interviewing senior students at St. Francis Xavier University (N = 15). Semi-structured interviews were analyzed using qualitative thematic analysis (Braun & Clarke, 2006). Results identified four key themes: a) concerns, with codes of sexually transmitted infection (STI) concerns and other safety risks; b) enabling factors, like living in residence or the effects of alcohol; c) empowerment, such as enjoyment or confidence increase; and d) motivations of participation, with codes of seeking fun, craving attention, or wanting a no-strings-attached hookup. Moreover, participants provided feedback on a resource created to support the formation of a peer-guided toolkit for first-year sexual health programming. Senior students' reflections include advice they would offer to students in their first year, such as warnings about STIs, setting boundaries, and placing higher value on intimate interactions. These findings highlight specific challenges first-year students struggle to anticipate and the gaps in institutional messaging. Findings suggest that interactive workshops would be beneficial in teaching first-year students about hookup culture, with sexual health programming that provides realistic, actionable, and emotionally grounded guidance for navigating the culture on the StFX campus.

Karen Nicholson Award in Neuropsychology

Keirra Haley
Memorial University of Newfoundland

Tonic Activation of the Locus Coeruleus: Behavioural Insights into Cognitive Function and Aging

Keirra Haley[1], *Susan Walling*[1]
[1] *Memorial University of Newfoundland*
Supervisor: Susan Walling

As the brain ages, gradual changes can affect memory, attention, and emotional regulation. One of the earliest regions affected by aging is the locus coeruleus, a small but important brain structure that produces norepinephrine. This neurotransmitter helps regulate attention, arousal, learning, and memory. Changes in this system may contribute to cognitive decline and could play an early role in neurodegenerative disease.

This study explores how increasing activity in the locus coeruleus influences behaviour and cognitive function in adult rats. Using a targeted brain activation approach, activity in these cells was temporarily increased for behavioural testing. Rats then completed a series of well-established tasks used to measure memory, exploration, and anxiety-related behaviour.

By improving our understanding of how this system shapes behaviour, this research aims to clarify how norepinephrine supports cognition. This work may also help identify mechanisms that are important for maintaining cognitive health and resilience during aging.

About Karen Nicholson

Karen Nicholson (1971-2007) was a member of the Science Atlantic Psychology Committee whose research interest was in the neuropsychology of perception. Karen grew up in Lethbridge, Alberta where she received her Bachelor's degree from the University of Lethbridge. She then completed her Master's degree in Psychology at the University of Western Ontario (UWO), followed by doctoral studies of the types of cues (shape, colour) that impact perception, also at UWO. Karen's interest in the neuropsychology of perception was furthered during her postdoctoral work with Kevin Munhall at Queen's University. She carried on to her own lab at Mount Allison University in 2002, where she was hired as an Assistant Professor.

CIHR-IGH-Sex and Gender Based Award (Oral)

Leah Hicknell
St. Francis Xavier University

Exploring Women's Experiences with Autism Spectrum Disorder

Leah Hicknell[1], *Erin Austen*[1]
[1] *St. Francis Xavier University*
Supervisor: Erin Austen

This research explores Canadian women's experiences with autism spectrum disorder (ASD), focusing on both those who have received a diagnosis in adulthood and those who suspect ASD but do not yet have a diagnosis. Women are often under diagnosed, misdiagnosed, or diagnosed later in life compared to men, leading to negative mental health outcomes, reduced sense of belonging, and limited access to supports. According to Hull's (2020) female autism phenotype theory, autistic girls and women often display traits, such as stronger social communication and masking behaviours, that differ from the traditional male-based presentation, contributing to diagnostic delays and missed recognition. Using a cross-sectional online survey of Canadian women aged 18 and older, with and without formal diagnoses in adulthood, this study examined women's diagnostic journeys, their perceptions of belonging and self-stigma, and the types of supports they felt would be most beneficial. Similarities and differences between the diagnosed and suspecting groups will be discussed. The findings from this study highlight a need for more inclusive diagnostic practices, support systems, and knowledge of ASD in women.

CIHR-IGH-Sex and Gender Based Award (Poster)

Patrick Belgrave
Mount Saint Vincent University

Impact of Sex and ASD Symptom Severity on Somatic Complaints in Adolescents

Patrick Belgrave[1], *L. Hume*[1], *C. Smith*[1]
[1]*Mount Saint Vincent University*
Supervisors: Derek Fisher, Donna Thompson

There is a growing movement to address the historical gender bias which pervades the greater body of psychological research, particularly with regards to phenotypic differences between males and females across a wide variety of disorders such as autism spectrum disorder (ASD). Previous studies have separately shown that both females and individuals on the autism spectrum exhibit increased somatic symptoms (aches, nausea, etc.) compared to the general population. The present study extends the research by examining the interaction between sex (male vs female) and ASD symptom severity group (ASG, high vs low) on somatic symptoms using a 2x2 factorial ANOVA. A significant interaction between sex and ASG was found, $F(1, 123) = 5.706$, $p = .02$, $\eta_p^2 = .044$. A simple effects analysis showed that the effect of ASG grouping was only present for females ($p = .008$), where no effect was found for males ($p = .447$). The findings of this study highlight the need to acknowledge that females with higher degrees of ASD symptoms may have unique challenges and support needs, which should be addressed in order to promote better long-term outcomes.

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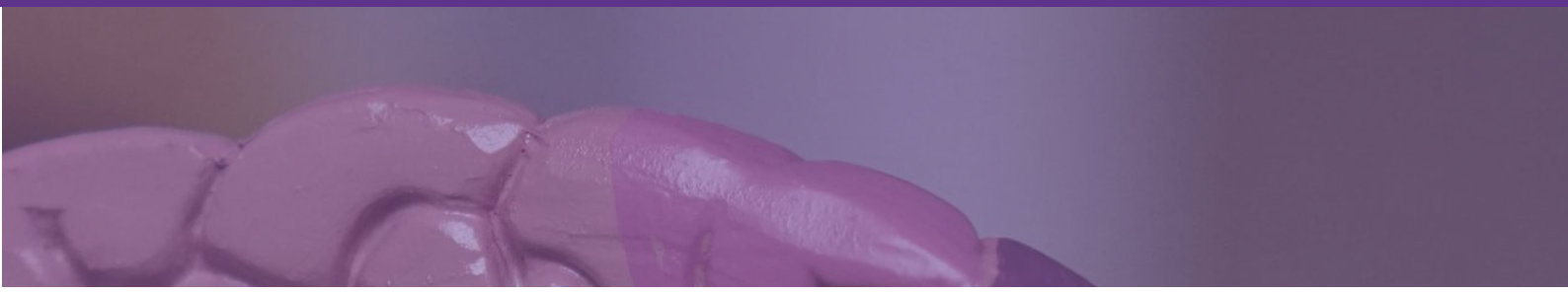

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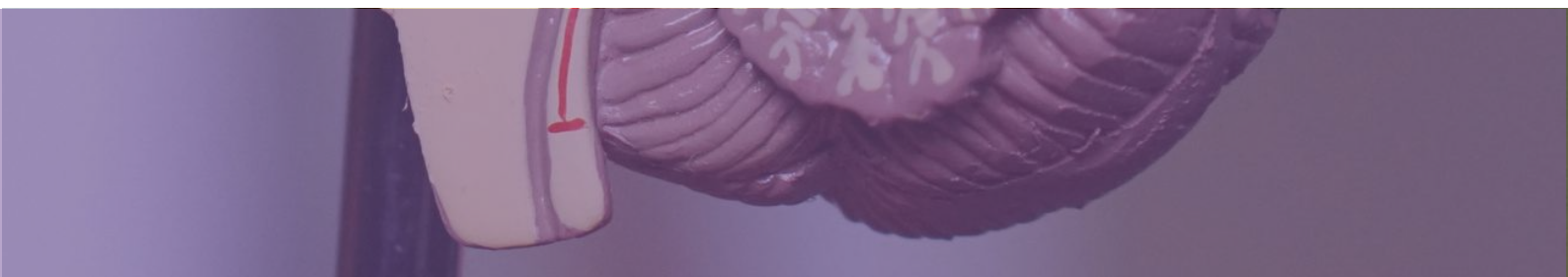

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