Science Atlantic | Science Atlantique

2019-2021 Yearbook

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Introduction

Hello!

On behalf of Science Atlantic, I am pleased to present the 2019-2021 Student Awards Yearbook, showcasing 138 award winning students on the following pages. They demonstrate the excellence in research and communication skills that Atlantic Canadian post-secondary students offer to the scientific community.

Like so many aspects of our lives impacted by the COVID-19 pandemic, this Yearbook is a bit different from the usual. Included are award winners from in-person conferences during the first half of the 2019-20 academic year as well as winners from a full roster of online events in 2020-21.

Students and organizers rose to the challenge of this new virtual format, and we were inspired by the quality of online presentations and events. Organizers welcomed impressive keynote speakers including Dr. Donna Strickland, the first Canadian woman to win a Nobel Prize in sciences, and Dame Jocelyn Bell Burnell, who discovered pulsars. Conference organizers also hosted a record number of panel discussions, workshops, competitions, social events, and even a virtual field trip via drone.

As well, we are incredibly grateful to our generous sponsors, listed on pages 189 to 191. Student conferences provide an opportunity to celebrate scientific talent at the undergraduate and graduate level, and we could not host these valuable events without your support.

Please join us in congratulating our 2019-2021 conference award winners!

Lois Whitehead
Executive Director
Science Atlantic

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60 Years of Science Atlantic

In 1962, the Atlantic Provinces Inter-University Committee on the Sciences (APICS) was founded to encourage collaboration across Maritime universities and the government sector. Over the past six decades, the organization has evolved and grown, now representing 18 post-secondary institutions from all four Atlantic provinces.

Science Atlantic's activities include workshops and networking opportunities for students and faculty, annual student conferences in ten disciplinary and interdisciplinary fields, awards recognizing students' research and communication skills, and speaker tours by notable scientists.

We are best known for our student conferences which are attended by approximately 900 undergrads, graduates, and faculty annually. These events offer students a variety of opportunities that help propel them closer to achieving their academic and professional goals. Over the years, some students who have attended conferences have completed their advanced studies and taken on professorial roles in the region, educating and mentoring new generations of students.

Sixty years attests to the strong support of the post-secondary STEM community. The advancements Science Atlantic has made over the years would not have been possible without our member institution leaders and faculty who have provided meaningful insight and offered countless hours of volunteer work.

We look forward to another successful sixty years of opportunity, inspiration, and community and hope to see you along our journey!

Science Atlantic comprises 18 member institutions across Atlantic Canada:

Acadia University

Cape Breton University

Crandall University

Dalhousie University

Dalhousie University, Agricultural Campus

Memorial University of Newfoundland

Memorial University, Grenfell Campus

Mount Allison University

Mount Saint Vincent University

Nova Scotia Community College

Saint Mary's University

St. Francis Xavier University

St. Thomas University

Université de Moncton

Université Sainte-Anne

University of New Brunswick, Fredericton

University of New Brunswick, Saint John

University of Prince Edward Island

Conference Directory

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Science Atlantic
Atlantic Universities
Geoscience Conference

AUGC

Science Atlantique
Conférence en géoscience
des universités de l'Atlantique

Each year the AUGC recognizes the achievements of some of Atlantic Canada's top undergraduate and graduate geoscience students through a variety of awards. There have been over 60 AUGC conferences hosted since 1962.

In 2019, the conference was hosted by St. Francis Xavier University from October 24 to 26. Events included field trips to Atlantic Gold's Moose River mine site and the Northumberland Strait. This provided an opportunity for students to experience the local geologic features and learn more regarding the geology of the conference location.

The conference presentation day featured students from across the Atlantic provinces speaking on a variety of geoscience topics, with six awards of distinction being awarded to presenters. In total, the conference welcomed 48 undergraduates, 9 graduates, 12 industry representatives, and 14 faculty members.

Science Atlantic

AUGC | Atlantic Universities Geoscience Conference

Award Winners 2019

Science Atlantic Best Paper
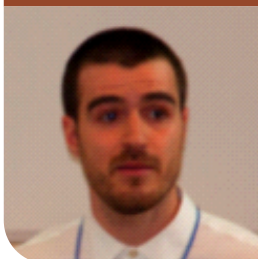
Miguel Vaccaro
Acadia University

Imperial Oil Best Paper

Andrew Wagner
Saint Mary's University

The Frank S. Shea Memorial Award in Economics
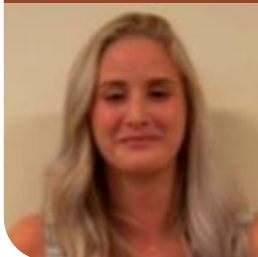
Natalie McNeil
Saint Mary's University

AGS Environmental Geoscience Award

Kayla Lawrence
Memorial University of Newfoundland

Canadian Society of Exploration Geophysics (CSEG) Award

Alex Bugden
Memorial University of Newfoundland

Canadian Society of Petroleum Geologists (CSPG) Award

John Mishael Dooma
Saint Mary's University

The MSCS conference is a joint event between two Science Atlantic Divisions, Computer Science and Mathematics & Statistics.

The 2019 MSCS Conference was hosted by Dalhousie University from October 25 to 27 and was attended by more than 200 students and faculty from across the Atlantic region. These students had the opportunity to display and show their research to peers and faculty in a series of student presentations.

The conference hosted lectures and talks by speakers Dave Kung from University of Maryland, Jeffrey Shallit from University of Waterloo, and Michael Newton from University of Wisconsin.

Two mainstays of the MSCS conference are the Science Atlantic Problem Solving Competition and the Atlantic Canadian Programming Contest. These competitions allow students to exercise their knowledge and problem-solving abilities in the fields of Mathematics and Computer Science, respectively.

Thanks to the support of generous conference sponsors as well as conference organizers, each year Mathematics & Statistics and Computer Science recognizes the achievements of some of Atlantic Canada's top undergraduate and graduate MSCS students through a variety of awards.

Science Communication Award

Aaron Dwyer and Michael Willette
Memorial University of Newfoundland, Grenfell

The Mathematics & Statistics and Computer Science Conference features plenary talks in mathematics (the Blundon lecture), statistics (the Fields lecture), and computer science (the Sedgwick lecture). The Blundon lecture is named for Professor W.J. Blundon, the first head of the Department of Mathematics and Statistics at Memorial University of Newfoundland, who was a prominent figure in mathematics and educational circles in Atlantic Canada for many years. In 2011, the computer science lecture was named after Dr. Arthur Sedgwick, the Dalhousie University member of the Science Atlantic (then APICS) Mathematics & Statistics Committee from 1978 until his retirement in 2010, including six years as the committee's chair.
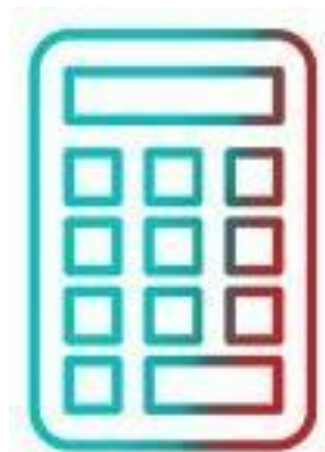
Science Atlantic

MSCS | Mathematics & Statistics and Computer Science Conference

Award Winners 2019

Science Atlantic Undergraduate Research Award, First Place

Mathematics & Statistics

Jeremy Peters
Dalhousie University

Computer Science

Will Taylor-Melanson
University of Prince Edward Island

Science Atlantic Undergraduate Research Award, Second Place

Mathematics & Statistics

Samantha Bardwell
St. Francis Xavier University

Computer Science

Lawrence Daniel Doucett
Saint Mary's University

Science Atlantic Undergraduate Research Award, Third Place

Mathematics & Statistics

Everett Patterson
Mount Allison University
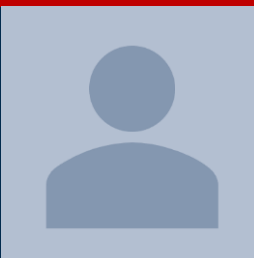
Computer Science

Nicholas Barreyre
Dalhousie University

Science Atlantic
MSCS | Mathematics & Statistics and Computer Science Conference

Science Atlantic Mathematics Problem Solving Competition

First Place

Ellen Doria and Renzo Flores
University of New Brunswick - Fredericton

Second and Third Place Tie

Xiaoyu Jia and Vaughn Menchions
Dalhousie University

Second and Third Place Tie
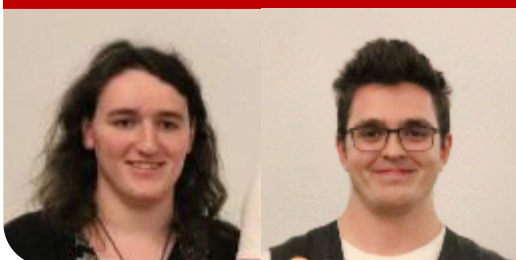
Angela Dawson and Sam Bauer
Memorial University of Newfoundland

Atlantic Canadian Programming Contest

First Place

Isaac Lee, Crystal Sharpe, Graeme Zinck
Mount Allison University

Second Place

Scott MacIntosh, Christopher MacDonald, Will Taylor-Melanson
University of Prince Edward Island

Third Place

Cornelius Smith, Justin Hiltz, John Marcoux
Acadia University

Science Atlantic
Atlantic Undergraduate Physics
& Astronomy Conference

AUPAC

Science Atlantique
Conférence en physique et
astronomie pour étudiants de
premier cycle de l'Atlantique

The Atlantic Universities Physics & Astronomy Conference (AUPAC) is an annual event which aims to bring together students and faculty from across the Atlantic provinces involved in learning, teaching, and doing research in the fields of Physics and Astronomy.

AUPAC 2020 was hosted from January 31 to February 2 by St. Francis Xavier University in Nova Scotia. The conference featured six keynote speeches which were open to the public. Speakers included The first female, Canadian Nobel Prize winner, Donna Strickland, and NASA engineer Renee Horton.

As one of the annual AUPAC events, conference attendees competed in teams for the AUPAC Cup, a competition featuring trivia and other fun challenges. The 2020 AUPAC Cup was won by Acadia University.

Five student presenters were recognized for their excellence in the areas of science communication and research.

Science Atlantic

AUPAC | Atlantic Undergraduate Physics & Astronomy Conference

Science Communication Award

Matthew Coon
Dalhousie University

The Tindall/Steinitz Award

Laurent Molino
Dalhousie University

Best Poster Award

Zoë Wright
Mount Allison University

Honourable Mentions

Experiment/Observation

Isabelle Dolan
Mount Allison University

Theory/Simulation

Matthew Leighton
Dalhousie University

The Science Atlantic Nutrition and Foods Conference brings together nutritional and food scientists, educators, and students from universities across the Atlantic Provinces. In 2020, this event was hosted by the University of Prince Edward Island on March 13 and 14.

SANFC 2020 was the second ever conference to be hosted by the Nutrition and Foods Division of Science Atlantic and was attended by over 50 students, faculty, researchers, and speakers.

Conference events included a Tradeshow Exhibit, workshops from Dr. Shannan Grant, Chelsey Purdy, and Dr. Patty Williams, a keynote presentation from Dr. Susan Whiting, and a closing awards ceremony and reception at which 11 awards were presented to students.

Science Atlantic

SANFC | Nutrition and Foods Conference

Award Winners
2020

Science Communication Award

Julia Heckbert
University of Prince Edward Island

Travel Award

Oral

Kate Braddon
Mount Saint Vincent University

Chelsea Purdy
Mount Saint Vincent University

Travel/Registration Award

Oral

Jelisa Gallant
Mount Saint Vincent University

Poster

Lia Chin-Yet
Mount Saint Vincent University

Science Atlantic Undergraduate Research Award

Poster Enhanced

Tim Lamont
Acadia University

Poster Enhanced

Imene Hank
University of Prince Edward Island

Oral

Kate Braddon
Mount Saint Vincent University

Science Atlantic Graduate Research Award

Poster

Jelisa Gallant
Mount Saint Vincent University

Poster

Cindy Yu
Dalhousie University, Agricultural Conference

Oral

Lauren Viana
St. Francis Xavier University

Science Atlantic
Mathematics & Statistics and
Computer Science Conference

MSCS

Science Atlantique
Conférence en mathématiques
et statistique et en **informatique**

Every fall since 1978, the Mathematics & Statistics Division of Science has held a conference designed specifically to attract the interest of undergraduate students. Since partnering with the Computer Science Division, the MSCS combines the interests of students in Math, Statistics, and Computer Science fields.

In 2020, MSCS was held virtually from October 31 to November 1 by Saint Mary's University in Nova Scotia. This new virtual format was a great success, with a turnout of 156 attendees, 25 Math contestants, 43 Programming contestants, 19 undergraduate and 6 graduate presentations.

More information on the Programming Contest and Problem Solving Competition can be found in the Award Descriptions section of the Yearbook, or the Science Atlantic website.

Science Atlantic

MSCS | Mathematics & Statistics and Computer Science Conference

Award Winners 2020

Best Computer Science Oral Presentation

First Place

Bivash Pandey
Saint Mary's University

Second Place

David Leblanc
Acadia University

Best Mathematics and Statistics Oral Presentation

First Place

Alexander Clow
St. Francis Xavier University

Second Place

Amanda Porter
Mount Allison University

MSCS 2020 was the first Science Atlantic conference to be hosted virtually!

Science Atlantic
MSCS | Mathematics & Statistics and Computer Science Conference

Atlantic Canadian Programming Contest

First Place

Jueqi Wang, Ti Zhou
St. Francis Xavier University

Second Place

Rija Ali, Calum Bird, Crystal Sharpe
Mount Allison University

Third Place

Christopher MacDonald, Scott MacIntosh, Will Taylor-Melanson
University of Prince Edward Island

Science Atlantic Mathematics Problem Solving Competition

First Place

Xiaoyu Jia
Dalhousie University

Second Place
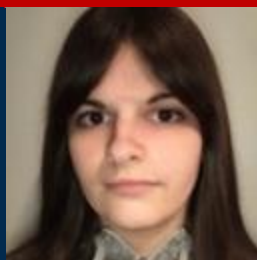
Vaughn Menchions
Dalhousie University

Third Place, Tie

Ellen Doria
University of New Brunswick

Third Place, Tie

Cameron Nickerson
Mount Allison University

Science Atlantic
Atlantic Universities
Geoscience Conference

AUGC

Science Atlantique
Conférence en géoscience
des universités de l'Atlantique

The Atlantic Universities Geoscience Conference (AUGC) is an annual student-led conference that connects undergraduate students in Atlantic Canada. The AUGC allows students to present their research as well as listen to the research of their peers in the Atlantic provinces.

Each year the AUGC recognizes the achievements of some of Atlantic Canada's top undergraduate and graduate geoscience students through a variety of awards.

The 2020 AUGC was hosted virtually by the University of News Brunswick, Fredericton, on November 21. The program featured presentations from students, talks from industry experts, guest speakers, a virtual field trip, and networking opportunities.

Science Atlantic

AUGC | Atlantic Universities Geoscience Conference

Science Atlantic Best Paper

Joshua Jackman
Saint Mary's University

Imperial Oil Best Paper

Marie Flanagan
Memorial University of Newfoundland

The Frank S. Shea Memorial Award in Economics

Moya MacDonald
University of New Brunswick

AGS Environmental Geoscience Award

Hannah Sharpe
University of New Brunswick

Canadian Society of Exploration Geophysics (CSEG) Award

Sarah Greene
Memorial University of Newfoundland

Canadian Society of Petroleum Geologists (CSPG) Award

Lindsay Oldham
Memorial University of Newfoundland

Science Atlantic
Atlantic Undergraduate Physics & Astronomy Conference

AUPAC
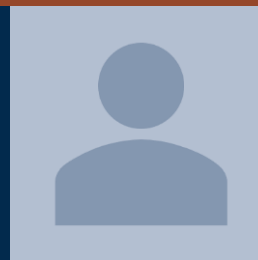
Science Atlantique
Conférence en physique et astronomie pour étudiants de premier cycle de l'Atlantique

The Atlantic Universities Physics & Astronomy Conference 2021 was hosted virtually by Dalhousie University, February 5 to 7, 2021. Thanks to the support of generous conference sponsors, each year AUPAC recognizes the achievements of some of Atlantic Canada's top undergraduate and graduate physics and astronomy students through a variety of awards.

For AUPAC 2021, guests attended keynote presentations from internationally recognized experts Jocelyn Bell Burnell, Jeff Dahn, John Dutcher, and Themos Kallos. Two panels were held to discuss relevant and interesting topics in the field of physics, and attendees were able to gain insight into Canada's top graduate schools at a graduate school fair.

The student presentations showcased the research of young physicists of Atlantic Canada through oral and poster presentations. The best of the best presentations were selected for awards of distinction.

Science Atlantic Communication

Peter Smith
Saint Mary's University

The Tindall/Steinitz Award in Research

Desiree Rehel
University of Prince Edward Island

Best Poster Award
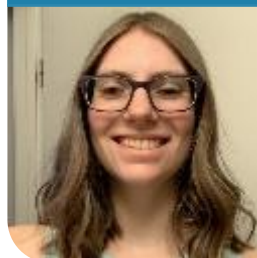
Maggie Lawrence
University of New Brunswick

Science Atlantic's Physics Division officially added 'Astronomy' to its title in the mid-90's to reflect the steadily growing interest in the sub-field. AUPAC has been running annually since 1982!

Experimental/Applied Physics

Best Oral Presentation   **Honourable Mention**

Jenna Chisholm
Mount Allison University

Isabelle Dolan
Mount Allison University

Computational/Modelling Physics

Best Oral Presentation   **Honourable Mention**
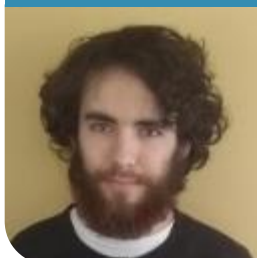
Mathieu Perron-Cormier
Université de Moncton

Padraic Odesse
Mount Allison University

Theoretical/Mathematical Physics

Best Oral Presentation   **Honourable Mention**

Daniel Winters
St. Francis Xavier University

Luke Fraser-Leach
Dalhousie University

Each year the achievements of some of Atlantic Canada's top undergraduate and graduate aquaculture and fisheries students are recognized during the Aquaculture & Fisheries and Biology (AFB) conference through a variety of awards. The AFB Conference is a joint effort of the Aquaculture & Fisheries and Biology Divisions of Science Atlantic.

AFB 2021 was hosted virtually March 12 to 14 by Cape Breton University. The conference featured poster presentations and oral presentations from graduate and undergraduate students representing their post-secondary institutions across Atlantic Canada.

The conference hosted several sessions for students to present their research in the fields of Aquaculture, Fisheries, and Biology, as well as sessions for networking and socializing, a trivia night, speeches from Jeff Clements and Yolanda Wiersma, and an awards ceremony at which fifteen students were given special recognition for their research.

Science Atlantic

AFB | Aquaculture & Fisheries and Biology Conference

Science Communication Award

Aquaculture & Fisheries
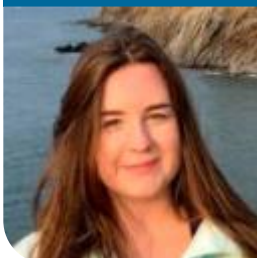
Jaime Rae
Dalhousie University

Biology

Alexie Ouellette
Mount Allison University

Canadian Botanical Society Award

Best Oral Presentation

Terrell Roulston
Saint Mary's University

Best Poster Presentation

Brooke Dauphinee
Mount Saint Vincent University

Each year the Aquaculture & Fisheries Division partners with the Biology Division to encourage student-to-student and student-to-scientist communications through the Aquaculture & Fisheries and Biology Conference.

Science Atlantic AFB | Aquaculture & Fisheries and Biology Conference

Award Winners 2021

Science Atlantic Undergraduate Research Award (Biology)

First Place - Oral
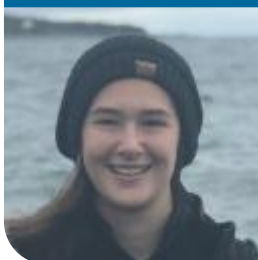
Lauren Sobot
St. Francis Xavier University

First Place - Poster

Mia Francis
University of New Brunswick, Saint John

Second Place - Oral

Naomi Meed
University of New Brunswick, Fredericton

Second Place - Poster

Brooke Dauphinee
Mount Saint Vincent University

Third Place - Oral

Kelsey Mercer
Saint Mary's University

Third Place - Poster

Amy Dodge
St. Francis Xavier University

Science Atlantic Award Winners 2021

AFB | Aquaculture & Fisheries and Biology Conference

Science Atlantic Undergraduate Research Award (Aquaculture & Fisheries)

First Place - Oral
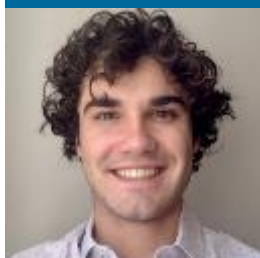
Victor Papaiz
Dalhousie University

Second Place Tie - Oral

Reid Sutherland
University of New Brunswick, Fredericton

Second Place Tie - Oral
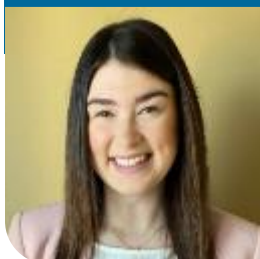
Kate Tobin
Memorial University of Newfoundland

Third Place - Oral

Maria Mason
University of New Brunswick, Fredericton

Aquaculture & Fisheries Graduate Oral Presentation

First Place

Hajarooba Gnanagobal
Memorial University of Newfoundland

Second Place

My Dang
Memorial University of Newfoundland

Science Atlantic
Environment Conference

Science Atlantique
Conférence en environnement

The annual Science Atlantic Environment Conference is an opportunity for students to present their research, learn about their peers' research, and interact as well as network with students and professors in the Atlantic Provinces. The conference is open to all students and faculty with an educational or research interest in any academic area related to the environment.

Thanks to the support of conference sponsors and organizers, each year SAEC recognizes the achievements of some of Atlantic Canada's top undergraduate and graduate environment studies students through a variety of awards.

The 2021 SAEC was co-hosted virtually by Cape Breton University and University of New Brunswick (Fredericton) on March 13. The conference featured talks and poster sessions by students. The program included social and networking activities, and plenary speaker, and prizes awarded to student presenters.

Science Atlantic
Environment
Conference

Virtual Conference
March 13, 2021

Cape Breton
University and
University of New Brunswick (Fredericton)

Science Atlantic Environment Conference

Award Winners 2021

Science Communication Award

Nina Garrett
Dalhousie University

Science Atlantic Acadian Award

First Place

Andrew Willms
Dalhousie University

Second Place

Hannah Kosick
Cape Breton University

Pecha Kucha Prize

First Place

Marwa Jebali
Université de Moncton

Second Place

Damien Mullin
University of New Brunswick, Fredericton

Science Atlantic Environment Conference

Award Winners
2021

Science Atlantic Undergraduate Research Award

First Place

Makadunyiswe Ngulube
Saint Mary's University

Second Place

Samantha Howard
Dalhousie University

Science Atlantic Graduate Research Award

First Place

Rachel Noddle
Dalhousie University

Second Place

Kaushalya Rathnayake
University of New Brunswick, Fredericton

Science Atlantic Research Award Poster

First Place

Molly Bradford
Acadia University

Second Place

Natalie Parsons
Memorial University of Newfoundland, Grenfell

Science Atlantic Nutrition and Foods Conference — SANFC — **Science Atlantique** Conférence en nutrition et alimentation

The Science Atlantic Nutrition and Foods Committee is comprised of nutritional and food scientists and educators from each University in the Atlantic Provinces that has either an established nutrition or food science department, program or faculty position. Each year, the Science Atlantic Nutrition and Foods Conference serves to recognize the achievements of some of Atlantic Canada's top undergraduate and graduate Nutrition and Food Sciences students through a variety of awards.

In 2021, the conference was hosted by St. Francis Xavier University from April 26 to 27. The conference featured many keynote speakers; Dr. Doris Gillis, Dr. Natalie Carrier, Dr. Raymond Thomas, Kara Pictou, Ann Fox, and Renne Bujold provided talks on a variety of subjects. SANFC 2021 was enjoyed by faculty, students, as speakers as a way to connect with peers and colleagues from across Atlantic Canada.

Science Atlantic
SANFC | Nutrition and Foods Conference

Science Communication Award

First Place

Nèmanan Richard Ninamou
Université de Moncton

Second Place

Rebecca Dennings
St. Francis Xavier University

Third Place

Salma Omardeen
Memorial University of Newfoundland

Science Atlantic Undergraduate Research Award

First Place

Rachael Moss and Sophie Barker
Acadia University

Second Place

Megan Churchill
Mount Saint Vincent
University

Third Place

Rianna Teeuwissen
University of Prince
Edward Island

Fourth Place

Cayla Olynyk
St. Francis Xavier
University

Science Atlantic

SANFC | Nutrition and Foods Conference

Award Winners
2021

Science Atlantic Graduate Research Award

First Place

Niluni Wijesundara
Dalhousie University

Second Place

Tharindu Lakshan Suraweera
Dalhousie University

Third Place

Lauren Viana
St. Francis Xavier University

Fourth Place
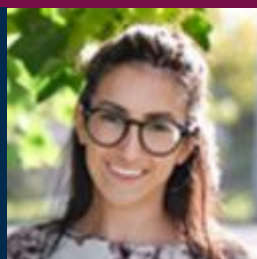
Julianne LeBlanc
Mount Saint Vincent University

Nutrition and Foods is the newest Division of Science Atlantic, formed in 2017!

Science Atlantic
Psychology Conference

Science Atlantique
Conférence en psychologie

Since 1977, the Psychology Division of Science Atlantic has held an annual conference to bring together faculty and students across the Atlantic provinces in recognition and celebration of research and study of Psychology and related fields.

This exchange of information between students and professors each May serves to improve instruction methodology in psychology and provides faculty and students with a means of enhancing communications for over 30 years.

The 2021 SAPC was held virtually by Memorial University of Newfoundland, Grenfell Campus May 6 and 7. The conference included social networking events, presentations on a variety of Psychology topics, a panel discussion, and prizes awarded to seven student presenters.

Science Atlantic Psychology Conference

Science Atlantic Undergraduate Award

Allyson Lamont
University of New Brunswick, Saint John

Michaela Ritchie
University of New Brunswick, Saint John
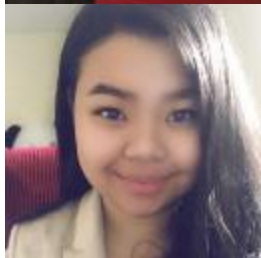
Abbie Morales
Memorial University of Newfoundland, Grenfell

Hannah James
Mount Allison University

Science Communication Award

Robb Tupper
Acadia University

Mya Dockrill
Dalhousie University

Karen Nicholson Award

Saisha Rankaduwa
Dalhousie University

The Chemistry Division of Science Atlantic is committed to raising the standards of chemistry education, participating in Science Atlantic's annual ChemCon, and organizing lecture tours featuring notable scientists. ChemCon was initially held every second year until 1985, when its popularity justified holding the conferences annually. The conference is now held every May or June.

In 2021, ChemCon was hosted virtually by Mount Allison University on May 20 and 21. The conference facilitated a number of student research presentations and also featured Keynote Speaker Dr. Warren Chan, a panel discussion on "Non-Academic Career Paths", an online trivia night, and a Graduate Fair and Exhibition featuring University of New Brunswick, University of Victoria, University of Saskatchewan, Dalhousie University, McGill University, Memorial University of Newfoundland.

Student presentations were separated into six disciplines of Chemistry. Multiple awards for presentation and research were awarded to graduate and undergraduate students in each category, with 29 students commended for their dedication to Chemistry research.

Science Atlantic ChemCon | Chemistry Conference

Science Communication Award

First Place

Jennifer Kolwich
Saint Mary's University

Science Atlantic Undergraduate Research Award

First Place

Kaleigh McLeod
Saint Mary's University

Second Place

Jacob Hoare
Saint Mary's University

Best Analytical Chemistry Presentation

Undergraduate Award Winners

First Place - Oral

Kaleigh McLeod
Saint Mary's University

First Place - Poster

Allison Pond
Memorial University of Newfoundland

Second Place - Poster

Sydney Crain
University of New Brunswick

The Chemistry Division was established at the inaugural meeting of APICS in 1962.

Best Analytical Chemistry Presentation

Graduate Award Winners
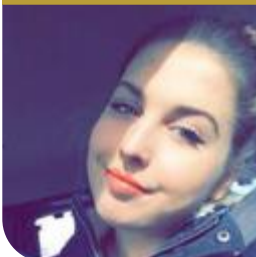
First Place - Oral

Maddison Eisnor
Saint Mary's University

First Place - Poster
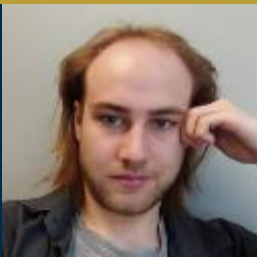
Brian Youden
Waterloo University

Award Winners
2021

Best Computational/Theoretical Chemistry Presentation

Undergraduate Winner
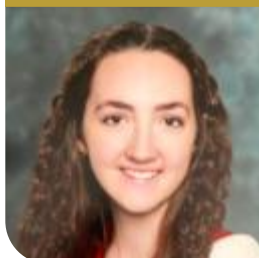
Claire Anderson
University of New Brunswick

Graduate Winner

Katherine Parsons
Dalhousie University

Best Inorganic Chemistry Presentation

Undergraduate Award Winners

First Place - Oral

Cole Smolensky
Mount Allison University

Second Place - Oral

Alex MacDonald
Mount Allison University

First Place - Poster

Padmapriya Srinivasan
Mount Allison University

Since its inception at the inaugural Science Atlantic (then APICS) meeting in 1962, the Chemistry Committee has been active in organizing an annual Speaker Tour, bringing accomplished scientists in the field right to the classrooms of Atlantic Canadian students.

Science Atlantic ChemCon | Chemistry Conference

Best Inorganic Chemistry Presentation

Graduate Award Winners
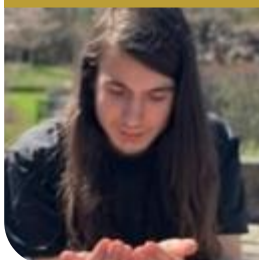
First Place

Tanner George
Saint Mary's University

Best Organic Chemistry Presentation

Graduate Award Winners

First Place - Oral

Jenny Hogenbom
Acadia University

Second Place - Oral

Shantelle Mercer
Cape Breton University

Third Place - Oral

Dreenan Shea
Dalhousie University

First Place - Poster

Petra Larsen
University of Prince Edward Island

Science Atlantic ChemCon | Chemistry Conference

Best Organic Chemistry Presentation

Undergraduate Award Winners

First Place - Oral	First Place - Poster

Natasha Vatcher
University of New Brunswick

Olivia Singer
Saint Mary's University

Second Place - Oral	Second Place, Tie - Poster

Haozhe Vincent Wang
Acadia University

Megan Ethier
St. Francis Xavier University

Third Place - Oral	Second Place, Tie - Poster

Darian MacLean
St. Francis Xavier University

Sarah Smit
University of New Brunswick

Science Atlantic
ChemCon | Chemistry Conference

Best Physical/Material Chemistry Presentation

Undergraduate Award Winners

First Place - Oral

Tara Ann Misener
University of Prince Edward Island

First Place, Tie - Poster
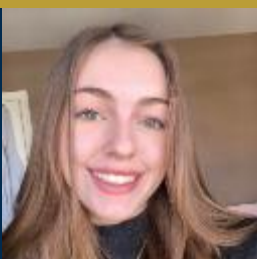
Grace Mercer
Memorial University of Newfoundland

Second Place - Oral
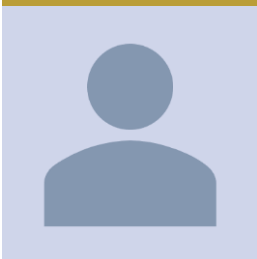
Sammy Hanuka
Dalhousie University

First Place, Tie - Poster

Kate Leslie
Mount Allison University

Second Place - Poster

Rylan Clark
St. Francis Xavier University

Graduate Award Winners

First Place - Oral

David Morris
Dalhousie University

Award Descriptions

This section contains descriptions for awards given at all Science Atlantic conferences as well as awards specific to individual divisions.

File Explorer > Conferences > Award Descriptions

More details on all these awards can be found at scienceatlantic.ca.

General Conference Awards

Science Communication Award

The Science Communication Award, offered at each of the annual Science Atlantic-sponsored student conferences, is awarded to the student(s) best able to communicate a science topic to their peers. This award is co-sponsored by Canada Science Publishing, the Atlantic Student Research Journal, and Science Atlantic.

Science Atlantic Undergraduate Research Award

This award is presented to the student(s) giving the best research presentation(s) at an annual Science Atlantic conference based on the quality of their abstract, presentation, scientific merit, and overall knowledge.

The Undergraduate Research Award is presented to the student(s) giving the best research presentation(s) at an annual Science Atlantic conference based on the quality of their abstract, presentation, scientific merit, and overall knowledge. Some of our conferences have named this award, namely:

The Science Atlantic Best Paper Award, presented at the Atlantic Universities Geoscience Conference, is a combination of the Science Atlantic Communication Award and Science Atlantic Undergraduate Research Award

The Tindall-Steinitz Research Award, presented at the Atlantic Undergraduate Physics and Astronomy Conference, is named in honour of two lifetime members of the Science Atlantic Physics & Astronomy Committee, David Tindall (Dal), and Michael Steinitz (StFX).

Science Atlantic Graduate Research Award

This award is presented to graduate students who have demonstrated outstanding research and presentation skills based on quality of abstract, presentation, scientific merit, and overall knowledge on either oral or poster presentations.

AFB Awards

Aquaculture & Fisheries Best Presentation Award

This award is presented annually based on the assessment of a judging panel as part of the Aquaculture & Fisheries stream at the annual Science Atlantic Aquaculture & Fisheries and Biology Conference. First, second, and third place awards are given.

Biology Best Poster Award

This annual award is given based on the assessment of a judging panel at the Biology stream of the annual Science Atlantic Aquaculture & Fisheries and Biology Conference.

Biology Best Presentation Award

This award is provided for the best oral presentation(s) in the Biology stream of the annual Science Atlantic Aquaculture & Fisheries and Biology Conference.

The Botany Award

The Botany Award is presented annually for the top undergraduate presentation (oral or poster). The prizes are awarded for the best presentation by an undergraduate student in the discipline of botany. The purpose of this recognition is to encourage undergraduate students to pursue graduate research in botany and to enhance the visibility of the Canadian Botanical Association.

AUGC Awards

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, based on the quality of their abstract, poster design, scientific merit, and overall understanding of the topic. This award has been sponsored by Imperial Oil since 2007.

Canadian Society of Petroleum Geologists (CSPG) Award

The CSPG Award is awarded annually for the best presentation of a petroleum geology-related paper at the annual AUGC. This award is sponsored by the Canadian Society of Petroleum Geologists.

Canadian Society of Exploration Geophysicists (CSEG) Award

Established in 2008, the Canadian Society of Exploration Geophysicists (CSEG) award is given to the student who presents the best overall geophysics paper at the AUGC conference. Winners are evaluated on the scientific merit of their work, general understanding of the material covered, and ability to effectively communicate this to the judges.

Frank S. Shea Memorial Award in Economic or Applied Geology

The Frank S. Shea Memorial Award honours the student making the best presentation regarding an aspect of or with implications for economic or applied geology. Student presentations are reviewed and judged by a panel of practicing geologists. This award is sponsored by the Mining Society of Nova Scotia.

Atlantic Geoscience Society Environmental Geoscience Award

Established in 2015 by the Atlantic Geoscience Society, this award recognizes the best project (talk or poster) at the annual AUGC involving a significant component of environmental geoscience.

AUPAC Awards

The Tindall/Steinitz Award in Research

The Tindall/Steinitz Award is the top prize given at the annual Atlantic Universities Physics & Astronomy Conference (AUPAC), awarded to the undergraduate student giving the best research presentation. The Award is named in honour of two longstanding members of the Physics & Astronomy Committee. This Award is the AUPAC version of the Science Atlantic Undergraduate Research Award offered at all Science Atlantic-sponsored conferences and is sponsored by the Science Atlantic Physics and Astronomy Committee.

ChemCon Awards

Canadian Association of Theoretical Chemists (CATC) Award

For over 30 years, the Canadian Association of Theoretical Chemists (CATC) has represented the interests of both academic staff at Canadian universities and permanent staff in national laboratories whose focus is in computational and theoretical chemistry. The CATC Award in Theoretical Chemistry is presented each year at the three national undergraduate chemistry conferences for top student presentations related to computational and/or theoretical chemistry.

Chemical Institute of Canada (CIC) Award

A number of divisions of the Chemical Institute of Canada (CIC) sponsor awards at ChemCon each year. Up to six divisions participate in any given year, providing prizes for the best undergraduate presentation(s) (oral or poster) in the following areas: Analytical Chemistry; Biological/Medicinal Chemistry; Inorganic Chemistry; Materials Chemistry; Organic Chemistry; and Physical, Theoretical, or Computational Chemistry. Judging for these awards is completed by chemistry professors from the host institution, with assistance from visiting chemists.

E. Gordon Young Award

The E. Gordon Young Award for Best Pedagogical Graduate Presentation (oral or poster) is given annually for a presentation best addressing pedagogical topics in Chemistry. In the event that there is no suitable graduate presentation in this area, the award may be given for a presentation made by an undergraduate student. The objectives of the award are to honour the memory of E. Gordon Young and to recognize an outstanding young chemist for their teaching and instructional abilities.

Murray Brooker Award in Chemistry

The Murray Brooker Award promotes undergraduate participation at chemistry conferences across Canada. The award recognizes presentations (both oral and poster) that focus on the student's undergraduate educational experience in chemistry, chemical engineering, chemical technology, or chemical technician studies. The Murray Brooker Award is sponsored by the Chemical Education Division of the Chemical Institute of Canada (CIC).

MSCS Awards

Atlantic Canadian Programming Contest Awards

The Atlantic Canadian Programming Contest is coordinated annually in conjunction with the Mathematics, Statistics and Computer Science Conference. Teams of up to three students have five hours to analyze problems, design solutions, and write computer programs to solve as many of the given problems as quickly as possible.

Until 2019, this competition, known as the Atlantic Canadian Preliminary Contest Awards, was part of the world-wide Intercollegiate Programming Contest (ICPC). Though it is now separate, the contest is designed to help university teams prepare to compete in the ICPC.

Science Atlantic Mathematics Problem Solving Competition Awards

Each year, the Science Atlantic Mathematics, Statistics and Computer Science conference is opened with a problem solving competition. Teams of two compete without the assistance of notes, calculators, computers, cellphones, etc. Winning team members each receive a cash prize and letter of commendation.

SAEC Awards

Acadian Award

The Acadian 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 or the Boreal Forest in Newfoundland and Labrador.

Pecha Kucha Prize

The Pecha Kucha Prize is a new award, first presented at SAEC 2021, awarded to the student with the best short presentation consisting of twenty slides, with twenty seconds allotted per slide.

SAPC Awards
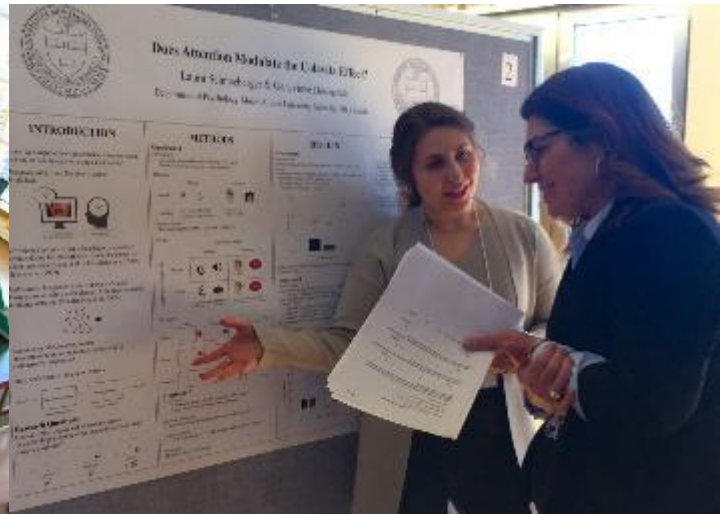
The Karen Nicholson Award in Neuropsychology

The Karen Nicholson Award in Neuropsychology, first presented in 2008, is awarded annually for the best undergraduate neuropsychology presentation (oral or poster) at the Science Atlantic Psychology Conference. The award is named in honour of Dr. Karen Nicholson, a member of the Psychology Committee who passed away in 2007 after a courageous battle with cancer. Karen will be remembered as a committed teacher and a talented and energetic researcher.

In the Fall of 1964, the psychology department heads at Acadia, Dalhousie, Mount Allison, Prince of Wales College, St. Dunstan's, and UNB applied to Science Atlantic (then APICS) for status as a division on psychology. It was the first division to have a defined terms of reference and has continued to grow ever since.

Award Winners Summary

Rija Ali, Mount Allison University	
Claire Anderson, University of New Brunswick	Machine Learning Towards Automated Discovery of Bipyridine Derivatives for Use in Non-aqueous Redox Flow Batteries
Sophie Barker, Acadia University	Carbonated emotions: Consumers' sensory perception and emotional response to carbonated and still fruit juices
Samantha Bardwell, St. Francis Xavier University	A Dynamic Individual-Based Model of a Population of People Who Inject Drugs
Nicholas Berreyre, Dalhousie University	Bitwise Conditional Controls Over Language Models for Music and Text
Sam Bauer, Memorial University of Newfoundland	
Calum Bird, Mount Allison University	
Kate Braddon, Mount Saint Vincent University	Evaluating Pre-and Post-Education Knowledge Scores from Women with Gestational Diabetes Mellitus Interacting with an Online Low Glycemic Index Education Platform
Molly Bradford, Acadia University	The Effects of Sediment Geochemistry on Methylmercury Production and Bioaccumulation in Intertidal Ecosystems
Alex Bugden, Memorial University of Newfoundland	Detailed Seismostratigraphy and Well Log Analysis of the Saglek Basin, Offshore Labrador, Using Regional Seismic Reflection Profiles and Intersecting Wells
Lia Chin-Yet, Mount Saint Vincent University	
Jenna Chisholm, Mount Allison University	Extraction of Differential Cross Sections for Neutral Pion Production off Helium-4
Megan Churchill, Mount Saint Vincent University	Thiamine Stability and Colour Changes in Salt Co-fortified with Iodine, Stored in Cambodia Over 6 Months
Rylan Clark, St. Francis Xavier University	Investigation of Urea Oxidation as a Potential Anode Reaction in CO_2 Electrolysis
Alexander Clow, St. Francis Xavier University	A New Approach to Finding Ideal Play in Poset Games
Matthew Coon, Dalhousie University	Lithium Metal vs. Lithium Ion Charging Rates
Sydney Crain, University of New Brunswick	Use of Glucomannan Gel to Mimic Salivary Proteins for Evaluation of Astringency for a Low-Cost Sensor System

Award Winners Summary

My Dang, Memorial University of Newfoundland	Susceptibility and Immune Response in Atlantic Salmon (Salmo salar L.) Farmed, Wild and Hybrid Crosses to Aeromonas Salmonicida Subsp Salmonicida Infection
Brooke Dauphinee, Mount Saint Vincent University	Roles of Temperature and Blue Light in Aerobic Methane Emissions from Canola Plants
Angela Dawson, Memorial University of Newfoundland	
Rebecca Demmings, St. Francis Xavier University	Nutrient Decomposition of Texture Modified Diets in Rural Nova Scotian Long-term Care Facilities: a Digital Food Photography Assessment
Mya Dockrill, Dalhousie University	The Development of Intuitive Cooperation
Amy Dodge, St. Francis Xavier University	The Role of the Adenosine A1 Receptor and HIF1a in the Cross-Tolerance of Danio rerio to Hypoxia and Ammonia
Isabelle Dolan, Mount Allison University	A Time-Walk Correction Method for the Glasgow Pair Polarimeter Detector
Isabelle Dolan, Mount Allison University	Designing and Simulating Wavelength Shifting Geometry in an Active Helium Target
John Mishael Dooma, Saint Mary's University	Paleoenvironment Reconstruction of the Cambrian-Ordovician Boundary of Western Newfoundland Using Petroleum Biomarkers and Carbon Isotope Chemostratigraphy
Ellen Doria, University of New Brunswick Fredericton	
Lawrence Daniel Doucett, Saint Mary's University	SphereSkeletons: Sphere-mesh Fitting for Extracting Topologically Accurate Medial Skeletons from Point Clouds
Aaron Dwyer, Memorial University, Grenfell	Domineering in Misère Play
Maddison Eisnor, Saint Mary's University	An Electrochemical SERS Investigation of Phenolic Compounds Present in Yellow Lake Pigments
Megan Ethier, St. Francis Xavier University	Visible Light Mediated Refinery Waste Degradation using Noble Metal Nanoparticle/Niobium Oxide Composites
Marie Flanagan, Memorial University of Newfoundland	Magnetics Study within the Valentine Lake Gold Property, Newfoundland and Labrador
Renzo Flores, University of New Brunswick, Fredericton	

Award Winners Summary

Mia Francis, University of New Brunswick, Saint John	Impacts of Sediment Chemistry on the Amphipod Corophium volutator in the Bay of Fundy.
Luke Fraser-Leach, Dalhousie University	On the Best Thermoelectric
Jelisa Gallant, Mount Saint Vincent University	Human Milk Total Thiamine Concentrations Among Rural Cambodian Women on Various Thiamine Supplementation Regimes, 12 weeks Postnatal
Nina Garrett, Dalhousie University	The Effect of Call Similarity on Call Discrimination by Tree Swallow (Tachycineta bicolor) Nestlings in the Presence of Noise
Tanner George, Saint Mary's University	Alkali Metal Azanides with a Highly Dynamic Phosphonium Fluorenylide Donor
Hajarooba Gnanagobal, Memorial University of Newfoundland	Renibacterium salmoninarum Chronic Infection and Lumpfish (Cyclopterus lumpus) Immune Response
Sarah Greene, Memorial University of Newfoundland	Geophysical Characterization Study of Robin Hood Bay Landfill, St. John's, NL
Imene Hank, University of Prince Edward Island	Assessing the Implementation of the New Canada's Food Guide Recommendations in Childcare Settings
Sammy Hanuka, Dalhousie University	Developing a SPICE Model for Redox Reactions in Porous Supercapacitor Electrodes
Julia Heckbert, University of Prince Edward Island	Food Use, Food Security and Food Production and Sales Across Growing Seasons Among Rural Kenyan Women
Justin Hiltz, Acadia University	
Jacob Hoare, Saint Mary's University	Synthesis of picolyl-substituted imidazolium salts for metal-organic frameworks and beyond
Jenny Hogenbom, Acadia University	Green Synthesis of Symmetrical Cationic Gemini Surfactants (Hogenbom)
Samantha Howard, Dalhousie University	Understanding Resistance to Flood Mapping: a Test of Climax Thinking in Southwestern Nova Scotia
Joshua Jackman, Saint Mary's University	Microanalysis of quartz and carbonate hosted fluid inclusions associated with polymetallic mineralization (Fe-Co-Ni-Cu-As-Ag-Sb-Au-Pb), of the Cape Saint Mary's, Lansdowne and Nictaux Falls dam occurrences in the Meguma Terrane, Nova Scotia

Award Winners Summary

Hannah James, Mount Allison University	Burnout and Job Satisfaction in a University Context: Does Self-Compassion Matter?
Marwa Jebali, Université de Moncton	Développement des Sondes DGT Spécifiques à l'Échantillonnage du Radium dans les Eaux Naturelles
Xiaoyu Jia, Dalhousie University	
Jennifer Kolwich, Saint Mary's University	Combating White-nose Syndrome using Fungus-Derived Inhibitory Compounds
Hannah Kosick, Cape Breton University	Cape Breton Abuzz: Naturalists Amass Data About Bumble Bees
Allyson Lamont, University of New Brunswick, Saint John	Food Insecurity, Mental Health Service Use, and Medical Healthcare: The Role of Depression
Tim Lamont, Acadia University	Surf'n Bake: Exploring the Sensory Characteristics of Seaweed Composite Bread
Petra Larsen, University of Prince Edward Island	Evaluation of the Longevity, Antibacterial, Antioxidant, and Anti-inflammatory Efficacies of Honey Extracted from Lozenges
Kayla Lawrence, Memorial university of Newfoundland	Examining CO_2 sequestration potential and subsequent mineral carbonation in ultramafic rocks from the Baie Verte, NL area1
Maggie Lawrence, University of New Brunswick	Designing 3-Magnet Arrays with MATLAB
David LeBlanc, Mount Saint Vincent University	General Game Playing with Deep Reinforcement Learning
Julianne LeBlanc, Mount Saint Vincent University	Patient Experience with Home-Based Gestational Diabetes Education during COVID-19: A Satisfaction Questionnaire
Isaac Lee, Mount Allison University	
Matthew Leighton, Dalhousie University	Constructing a Coarse-Grained Model for Cross-Linked Collagen Fibrils
Kate Leslie, Mount Allison university	Examining the Effects of Changes in Solvation Energy and Capillary Forces on the Self-Assembly of Gold Nanoparticles at the Oil/Water Interface
Alex MacDonald, Mount Allison University	Design and Synthesis of a Redox Active Diindane

Award Winners Summary

Christopher MacDonald, University of Prince Edward Island	
Moya MacDonald, University of New Brunswick	Design and Synthesis of a Redox Active Diindane
Scott MacIntosh, University of Prince Edward Island	
Darian MacLean, St. Francis Xavier University	Using Long Lived Phosphors to Extend the Light Response of Gold Nanoparticle Photocatalysts
John Marcoux, Acadia University	
Maria Mason, University of New Brunswick, Fredericton	Stable Isotope Analysis & Acoustic Telemetry Tracking to Determine Critical Habitat(s) of Yellow-Stage American Eels (Anguilla rostrata) in the Restigouche River and Estuary
Kaleigh MacLeod, Saint Mary's University	Thermomechanical Softwood Pulp Fibers, Filtration, and Personal Protection
Natalie McNeil, Saint Mary's University	The Mineralogy, Paragenesis, and Petrogenesis of the Polymetallic (Co-Ni-As-Au) Veins of the Nictaux Falls Dam Occurrence in the Annapolis Valley, Nova Scotia
Naomi Meed, University of New Brunswick, Fredericton	Fatal attraction? How Land Use Can Influence Community Composition of Atlantic Bumblebees
Vaughn Menchions, Dalhousie University	
Grace Mercer, Memorial University of Newfoundland	High-resolution Magic Angle Spinning Magnetic Resonance Spectroscopy to Study Changes in Placental Metabolites Over Gestation in Healthy Pregnant Mice
Kelsey Mercer, Saint Mary's University	Variability in Egg Hatching Time as Evidence of a Bet-Hedging Strategy in Japanese Medaka (Oryzias latipes
Shantelle Mercer, Cape Breton University	Characterization of Crab Biochar from Slow and Fast Pyrolysis
Tara Ann Misener, University of Prince Edward Island	Fluorescence-Based Investigations of the Host-Guest Inclusion of Anilinonaphthalene Sulfonic Acids (1,8- and 2,6-ANS) by Dimethoxypillar[5]arene in Nonaqueous Solvents
Laurent Molino, Dalhousie University	Taming the d-shell: an Analysis of the Effect of GGA+U in Density Functional Theory Models of Lithium-ion Battery Positive Electrode Materials
Abbie Morales, Memorial University of Newfoundland, Grenfell	The Effects of Linguistic Background in Young Adults' Executive Functioning

Award Winners Summary

David Morris, Dalhousie University	X-ray Absorption Spectroscopy Study of Au(130-x)Ag(x) Nanoclusters
Rachael Moss, Acadia University	Carbonated Emotions: Consumers' Sensory Perception and Emotional Response to Carbonated and Still Fruit Juices
Damien Mullin, University of New Brunswick, Fredericton	Predicting the Effects of Forest Harvest on Wood Turtle Habitat Suitability
Makadunyiswe Ngulube, Saint Mary's University	Wave Dissipation Potential of Spartina alterniflora in the Bay of Fundy
Cameron Nickerson, Mount Allison University	
Nèmanan Richard Ninamou, Université de Moncton	A Path Analysis to Identify Factors Influencing the Provision of Water in Addition to Breast Milk in Mothers of Children Under Six Months of Age in the Regions of Conakry and Kindia, Republic of Guinea
Rachel Noddle, Dalhousie University	Investigating the Nitrogen Biogeochemistry of Sewage Organic Materials Using Compound-Specific Isotope Analysi
Padraic Odesse, Mount Allison University	Monte-Carlo Analysis of Three Kepler Binary Star Systems
Lindsay Oldham, Memorial University of Newfoundland	Physical Stratigraphy and Provenance of Middle Jurassic to Lower Cretaceous Adventdalen Group sandstones, central Spitsbergen, Svalbard
Cayla Olynyk, St. Francis Xavier University	Uncovering the Student Athlete Lived Experience in Managing Exercise Associated Gastrointestinal Symptoms: a Mixed Methods Approach
Salma Omardeen, Memorial University of Newfoundland	Investigating the Mechanistic Roles of Oligofructose-enriched Inulin in Reducing Body Fat of Overweight and Obese Children
Alexia Ouellette, Mount Allison University	Determining Biological Function of miRNA Identified From PDAC Patient Plasma Using an In Vitro Model
Bivash Pandey, Saint Mary's University	Towards Video Based Collective Motion Analysis Through Shape Tracking and Matching
Victor Papaiz, Dalhousie University	Using Sportfishing Tournament Data to Determine Factors Influencing Black Bass (Micropterus spp.) Catches and Catch Trends
Katherine Parsons, Dalhousie University	Excitation Energy Transfer in the Chlorosome Light Harvesting Complex

Award Winners Summary

Natalie Parsons, Memorial University of Newfoundland, Grenfell	The Influence of Long-term Agricultural Management Practices on Red Wiggler Worm (Lumbricus rubellus) Population Abundance and Activity in Cormack, Newfoundland
Everett Patterson, Mount Allison University	Using Linear Algebra in Quantum Entanglement Theory
Mathieu Perron-Cormier, Université de Moncton	Retrieving Balmer Line Profiles
Jeremy Peters, Dalhousie University	Geometric Algebra for Relativity
Allison Pond, Memorial University of Newfoundland	Detecting Changes in Boreal Forest Groundwater Dissolved Organic Matter during the Autumn Transition Period via Study of Base-extracted Particulate Organic Matter
Amanda Porter, Mount Allison University	Hyperopic Cops and Robber
Chelsea Purdy, Mount Saint Vincent University	
Jaime Rae, Dalhousie University	Elevations of Lobster Fishery Groundlines and the Associated Entanglement Risk to North Atlantic Right Whales in Atlantic Canada
Saisha Rankaduwa, Dalhousie University	Re-Analysis of Body Representation in the Somatosensory Cortex: An Investigation of the "Femunculus"
Kaushalya Rathnayake, University of New Brunswick, Fredericton	Is There Variation in Phenotypic Selection on Floral Traits in Bee-pollinated Penstemons?
Desiree Rehel, University of Prince Edward Island	Computer Simulation of Two Polymers Confined to a Box-Like Cavity
Michaela Ritchie, University of New Brunswick, Saint John	The Role of Semantic Processing in the Generation Effect
Terrell Roulston, Saint Mary's University	Comparison of Pollinator Assemblages on Agricultural Dykelands in the Bay of Fundy
Crystal Sharpe, Mount Allison University	
Hannah Sharpe, University of New Brunswick	Benthic and Planktic Foraminifera Distribution Around Southampton Island, Hudson Bay
Dreenan Shea, Dalhousie University	Design of Visible-Light Activated Gold Nanoparticle/Niobium Oxide Perovskites for Application in Water Decontamination

Award Winners Summary

Olivia Singer, Saint Mary's University	Green Synthesis of Symmetrical Cationic Gemini Surfactants (Singer)
Sarah Smit, University of New Brunswick	Determination of the Stereochemistry of Two Polyketide Natural Products
Cornelius Smith, Acadia University	
Peter Smith, Saint Mary's University	Using Pulsars to Probe the Black Hole Content of 47 Tuc.
Cole Smolensky, Mount Allison University	Synthesis and Characterization of Novel Iminophosphineplatinum(II) Complexes Containing Aliphatic Groups
Lauren Sobot, St. Francis Xavier University	DNA Cruciforms in Vibrio Species
Padmapriya Srinivasan, Mount Allison University	Synthesis of Redox Active Indium Benzenethiolate Complexes
Tharindu Lakshan Suraweera, Dalhousie University	Dietary Flavonoids Attenuates Carcinogen-induced DNA damage in Cultured Human Lung Epithelial Cells
Reid Sutherland, University of New Brunswick, Fredericton	Effects of Hatchery Environments on Atlantic Salmon (Salmo salar): Comparing Egg Diameter, Fecundity, and Egg Survival Rates to the Eyed Stage Between Smolt-adult-supplementation Cohorts and Hatchery-winter Classes
Will Taylor-Melanson, University of Prince Edward Island	A Wearable System for Gait Phase Prediction and Interactive Movement Feedback
Rianna Teeuwissen, University of Prince Edward Island	The Complementary and Alternative Therapy Use, Dietary Behaviours, and Food Choices of People Living with Arthritis
Kate Tobin, Memorial University of Newfoundland	How Does Time of Collection During the Fishery Impact the Morphometrics of the Sea Cucumber (Cucumaria frondosa)?
Robb Tupper, Acadia University	The Art of Self-deception: Individual Differences in Death-thought Accessibility Following Standard Manipulations of Mortality Salience and Delay
Miguel Vaccaro, Acadia University	Petrology, Age, and Tectonic Setting of the Gunshot Brook Pluton, Eastern Cobequid Highlands, Nova Scotia
Natasha Vatcher, University of New Brunswick	Conformational Study of Unsaturated Organic Compounds: Computational Analysis using the Bent Bond/Antiperiplanar Hypothesis

Award Winners Summary

Lauren Viana, St. Francis Xavier University	Characterizing the Impact of Soaking and Germination on the Aroma Profile and the Chemical Composition of Yellow-Eyed Bean Flour
Lauren Viana, St. Francis Xavier University	The Effects of Dehulling and Germination on the Functional Properties and Off-Flavour Compounds in Yellow-Eyed Bean Flours
Andrew Wagner, Saint Mary's University	Characterization of Apatite-hosted Silicate Melt Inclusions in Magmatic Rocks Associated with the Cantung (W-Cu-Au) Skarn Deposit, Northwest Territories
Jueqi Wang, St. Francis Xavier University	
Haozhe Vincent Wang, Acadia University	Repellent and Acaricidal Effects of Basil Essential Oil and Rock Dust on Ticks
Niluni Wijesundara, Dalhousie University	Herbal Essential Oils to Treat Sore Throat: Antibacterial Activity of Carvacrol Against Streptococcus Pyogenes
Michael Willette, Memorial University of Newfoundland, Grenfell	Domineering in Misère Play
Andrew Willms, Dalhousie University	Quantifying the Causes of Increased Human-Black Bear Interactions Across Nova Scotia
Daniel Winters, St. Francis Xavier University	Alternative Theories of Gravity: Examining f(T) Gravity Cosmological Models
Zoë Wright, Mount Allison University	Convective Overshoot in Ceheid Variables
Brian Youden, University of Waterloo	Synergistic Multimodal Cancer Therapy using Glucose Oxidase@CuS Nanocomposites
Cindy Yu, Dalhousie University, Agricultural Campus	Identification of Superior Apple Genotypes for the Management of Type 2 Diabetes
Ti Zhou, St. Francis Xavier University	
Graeme Zinck, Mount Allison University	

Winner Abstracts

The following section contains the titles and abstracts of 118 award winning presenters from this past conference season.

You can find each winner and their abstracts organized alphabetically by last name!
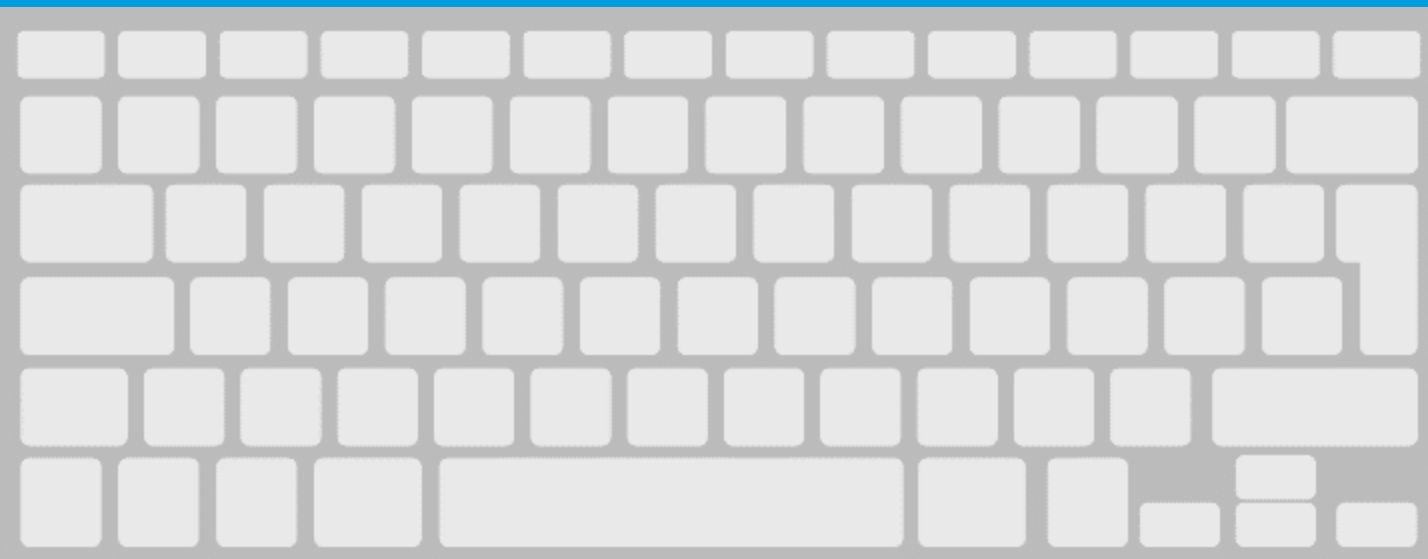
Machine Learning Towards Automated Discovery of Bipyridine Derivatives for Use in Non-aqueous Redox Flow Batteries

Claire Anderson, University of New Brunswick – ChemCon 2021

Theorists and experimentalists at the University of New Brunswick are interested in the redox properties of bipyridine derivatives for use in non-aqueous redox flow batteries as an alternative for large-scale energy storage systems. In this project, a script was generated to randomly substitute specific functional groups to each ring of bipyridine in the para position to the nitrogen atoms. To optimize the geometry, an MMFF94 force field was applied to each derivative and this became the geometry to be used for all future calculations on each state of bipyridine. After multiple derivatives were generated, Hessian calculations in the neutral (in gas phase and DMF), dication and dianion states (in DMF only) were run on each of derivative using GAMESS through Compute Canada. Genetic algorithms were applied to all of the derivatives obtained to generate different combinations of the functional group substituents and obtain more bipyridine derivatives overall. The results of all calculations were examined for the redox properties of each derivative. The redox potential was calculated for the dication and dianion states of bipyridine which were then used to calculate the overall cell potential. The bipyridine derivatives obtained showed to be promising candidates for use in non-aqueous redox flow batteries based on their cell potential values.

Carbonated Emotions: Consumers' Sensory Perception and Emotional Response to Carbonated and Still Fruit Juices

Sophie Barker, Rachael Moss, Acadia University – SANFC 2021

The global carbonated beverage market is very large, and consumers like the oral irritation (ex. burning, prickling) associated with carbonated beverages. This study's first objective was to identify the effect of carbonation on consumers' liking and sensory perception of fruit juices (blueberry, cherry, apple). The secondary aim was to evaluate consumers' emotional responses to carbonated fruit juices and what they like or dislike carbonated beverages. The first trial asked consumers (n=103) to use check-all-that-apply (CATA) and nine hedonic scales to evaluate six fruit juices (three carbonated and three non-carbonated). In the second trial, consumers (n=107) were asked to evaluate the same juice samples using the CATA variant of EsSense25 Profile® and a purchase intent scale. The consumers were also asked to identify what they like and dislike about carbonated beverages. The first trial identified that flavour was more important than carbonation but did identify that carbonation increased the overall liking of the blueberry and apple juices. In the emotional response trial, the participants did not separate the samples based on carbonation. The penalty analysis identified that when positive emotions were selected, the participants' purchase intent increased. Lastly, the consumers identified they like mouthfeel and flavour-enhancing qualities of carbonated beverages and associated them with special events. However, they disliked if beverages were too carbonated or flat and associated carbonated beverages with negative physical sensations and health perceptions. Future research should investigate how emotions affect purchase intent and evaluate how carbonation affects other beverages.

A Dynamic Individual-Based Model of a Population of People Who Inject Drugs

Samantha Bardwell, St. Francis Xavier University – MSCS 2019

A recent health crisis affecting vulnerable populations across Canada, including Nova Scotia, involves the presence of fentanyl and carfentanil in heroin and other drugs, greatly increasing the risk of fatal overdose. In fact, overdose risk depends on a host of other factors, drawn from demographics, use history, and available interventions. In this work, a dynamic, stochastic mathematical model is used to study the population dynamics of people who inject drugs (PWID). The mathematical model combines individual-based and population-level compartmental analysis approaches. By specifying the numerous characteristic-dependent relationships that form a user‚Äôs risk, the model aims to quantify the leading effects on injection drug risk and allow for accurate predictions for future trends in overdose fatality, recruitment into the population, and intervention efficacy. In this talk, I will provide an overview of the model, its implementation in Matlab, and its specific calibration to the PWID population of urban Toronto. I will then present results that show predicted impacts of varying model parameters and intervention strategies, and what current assumptions about mortality and recruitment imply for PWID population dynamics across decades.

Bitwise Conditional Controls Over Language Models for Music and Text

Nicholas Barreyre, Dalhousie University – MSCS 2019

Neural networks are effective language models. In particular, Long Short-Term Memory Recurrent Neural Networks can learn to generate sequences of words. When doing so, however, it can be hard to control the model after the training procedure has finished. To address this, we explore how conditioning a neural network can influence the generation process. Using data from two domains: English text and classical piano performance (an event-based representation), we demonstrate the effects of control signals. A control signal is an interpretable vector that is concatenated to each example. It provides information about the target during training. For example, knowing the composer of a piano performance gives information about the probability distribution over the next possible musical events. This vector allows a user to control one or more conditions of the probability distribution at test time. The user might indicate that they are sampling from the neural network based on the condition that the composer is Bach in one circumstance and that the composer is Rachmaninoff in another. We demonstrate several examples where a small (i.e. few-bit) control signal can be used to effectively apply simultaneously large and intricate effects on the generated output.

Evaluating Pre- and Post- Education Knowledge Scores from Women with Gestational Diabetes Mellitus Interacting with an Online Low Glycemic Index Education Platform

Kate Braddon, Mount Saint Vincent University – SANFC 2020

Introduction: Women who develop Gestational Diabetes Mellitus (GDM) are asked to implement behaviour change within a short period of time. Medical nutrition therapy is taught by registered dietitians as a self-management tool for GDM. Using glycemic index (GI) to choose carbohydrate foods is current standard care, according to Diabetes Canada Clinical Practice Guidelines (2018), but investigation is required to see if patients can increase GI knowledge through a low-GI education-based platform.

Design/Location: Prospective multicentre parallel-group randomised trial (secondary outcome analysis), based out of an urban teaching hospital in Nova Scotia. Hypothesis: GI knowledge scores will increase significantly within the low-GI group and between groups post-intervention. Objective: (1.) To assess if a low-GI education platform will increase participants (n=30) knowledge scores from baseline till 4 to 6 post-partum. (2.) To assess if GI knowledge will differ between study groups post-intervention.

Methods: Participants (n=1) were randomly allocated to the standard care (n=1) or low-GI group. Each group received a 40-minute educational class tailored to their study group. The Glycemic Index Questionnaire (GIQ©; standardized, pre-tested) was administered pre-intervention and post-intervention in the low-GI group and pre-intervention in the control group. Resulting knowledge scores are presented as percent (counts).

Results: One participant obtained a baseline knowledge score of 27% (4/14), 16 letters of information were signed, and 2 participants consented.

Discussion/Conclusion: The baseline knowledge score of the study participant is reflective of baseline data collected in other clinical studies applying the GIQ©. At the conference subsequent results will be presented within and between groups.

The Effects of Sediment Geochemistry on Methylmercury Production and Bioaccumulation in Intertidal Ecosystems

Molly Bradford, Acadia University – SAEC 2021

Due to their natural geochemistry, estuarine ecosystems are vulnerable to bioaccumulation of methylmercury (MeHg), a neurotoxin that readily bioaccumulates in organisms. Determining uptake of MeHg by intertidal invertebrates at the base of the food web is crucial in determining MeHg exposure in higher trophic level organisms like fish and birds. This research will quantify MeHg levels in sediment, porewater and invertebrates, and relate bioaccumulation of MeHg to changes in concentrations of sulfate and dissolved organic matter, in the Minas Basin, Bay of Fundy (UNESCO & Ramsar Sites). The formation of MeHg by sulfate-reducing bacteria during the reduction of sulfate to sulfide suggests that systems with sulfate loading may have increased MeHg concentrations in sediments. Dissolved organic matter (DOM) may reduce the uptake of MeHg by invertebrates, however DOM may also increase MeHg production by acting as an energy source for methylating bacteria. I hypothesize that bioaccumulation of MeHg in invertebrates will be greater in sediments with increased sulfate and DOM. To assess MeHg bioavailability invertebrate MeHg concentrations will be compared to DOM concentration, sulfur speciation, and Hg speciation in porewater and sediment. By identifying areas that are at greater risk for MeHg production and bioaccumulation, this research will help to protect the health of ecosystems critical to migratory birds, coastal fisheries, and many industries in Atlantic Canada.

Detailed Seismostratigraphy and Well Log Analysis of the Saglek Basin, Offshore Labrador, Using Regional Seismic Reflection Profiles and Intersecting

Alex Bugden, Memorial University of Newfoundland – AUGC 2019

The Labrador Sea is an ocean basin located off the coast of northern Labrador in which continental margins were formed by the rifting of the North American craton during the Cretaceous and early Tertiary periods. Within this ocean basin there lies several major sedimentary basins, of these the most northern Saglek Basin will be the focus. The basin is vast with an area exceeding 100,000 km2. During the tertiary, a trans-continental river system, known as the paleo-Bell River system, deposited much of the sedimentary fill present in the basin today. Sedimentary sequences in the northern part of the basin are underlain by Eocene tholeiitic drift basalts that thin progressively to the south where gneissic rocks become the new basement. There has been little exploration work done in the region; however, a drilling program was undertaken in the 1970s-1980s and a total of nine wells were drilled. Of these nine wells, this project will focus on the Snorri J-90 and Karlsefni A-13 wells, as they intersect seismic lines that were shot in 2001 by TGS. TGS has kindly made these seismic lines available for interpretation. The objective of this thesis is to combine seismic interpretation, well log analysis, and rock physics modelling to enhance knowledge of the evolution of the Saglek Basin. The well log analysis and seismostratigraphy will be performed using data provided by TGS and the C-NLOPB. Core analysis of the wells will also be undertaken if the core is available and has not deteriorated to the point where it is no longer useful. This will be confirmed by the C-NLOPB in the near future. If the core is intact, rock properties will be derived from the core samples and RokDoc software will be used to combine the core results with the geophysical well logs to generate improved synthetic seismograms. These will be imported into Petrel software to improve the well ties and the overall seismostratigraphic analysis. Ultimately, the evolution of the Saglek Basin, in light of the thesis results, will be presented.

Extraction of Differential Cross Sections for Neutral Pion Production off Helium-4

Jenna Chisholm, Mount Allison University – AUPAC 2021

Quantum Chromodynamics (QCD) is the theory of the strong force, which governs the internal structure of particles, such as protons and neutrons. The A2 Collaboration in Mainz, Germany is currently investigating QCD by measuring nucleon polarizabilities, which are fundamental structure observables sensitive to the inner workings of the nucleus. The A2 accomplishes this by shooting low to medium energy photons at a target, detecting the reactions, and analyzing specific processes that occur. The polarizabilities can then be measured by looking at processes such as Compton scattering, since their cross-sections are dependent on fundamental structure constants, such as the polarizabilities. These polarization observables have been previously measured, however the uncertainty of these measurements on neutrons is significantly worse than that of protons, since we cannot simply have a free-neutron target. Thus, over the years the A2 Collaboration has taken data on several different target materials in an effort to measure polarization observables to a higher degree of precision. In June 2019, data was taken on a Helium-4 target, requiring work on several pieces of code which would be able to identify certain processes and calculate their differential cross sections. By first completing this task for neutral pion production, we will be able to develop the framework for calculating the differential cross-sections of Compton scattering and extracting nucleon polarizabilities.

Thiamine Stability and Colour Changes in Salt Co-fortified with Iodine, Stored in Cambodia Over 6 Months

Megan Churchill, Mount Saint Vincent University – SANFC 2021

Introduction: Thiamine deficiency remains a public health concern in Cambodia. A potential intervention is the co-fortification of salt with both thiamine and iodine; however, the stability is thiamine in salt is currently unknown.

Research Question: To assess potential thiamine losses and colour changes in co-fortified salt.

Methods: Coarse and refined salt were spray fortified with a premix containing 30 ppm each of thiamine hydrochloride and potassium iodate. Fortified salt was stored in three storage conditions in Cambodia for 6 months: a cool dark place, a typical market condition, and a typical kitchen condition. Samples were collected over 6 months, and thiamine measured via HPLCFLD. Thiamine degradation was assessed over time, by storage condition. Colour change ($\triangle E$) was determined using HunterLab LabScan (CIELAB color scale).

Results: Thiamine degradation followed first order kinetics. After 6 months, salt stored in the dark place, market, and kitchen conditions had the following losses: refined salt: 49%, 21%, and 63%; coarse salt: 80%, 66%, and 60%. The mean colour change in the co-fortified refined salt was $\triangle E=3.84$, while for the coarse salt $\triangle E=2.11$.

Discussion & Conclusions: Thiamine losses were common among all salt samples, regardless of storage condition, likely due to the high ambient temperature in Cambodia (~30°C). Given that thiamine has no tolerable upper intake level, future overages should be feasible. Colour changes were minimal after 6 months of storage, but future organoleptic evaluations with Cambodian participants are warranted to ensure acceptability.

Investigation of Urea Oxidation as a Potential Anode Reaction in CO2 Electrolysis

Rylan Clark, St. Francis Xavier University – ChemCon 2021

Carbon dioxide (CO2) emissions have steadily increased since the beginning of the industrial revolution, currently amounting to over 30 billion tonnes produced. Only half of these emissions are being recycled through natural pathways, leading to a gradual increase in atmospheric CO2 levels. This increase is raising concerns of climate change and global temperature. Different devices have been developed to address this issue, including CO2 electrolyzers. While the CO2 electroreduction itself has been widely studied, the reaction taking place at the counter electrode of such device has not. Herein, we investigated the electrooxidation of CH4N2O (urea) as a counter electrode reaction using Ni90Fe10 electrodeposited films as catalysts. It showed an excellent activity of 135 mA/cm2geo (determined by cyclic voltammetry) and stability (90-76.5 mA/cm2geo) over thirty-minute exposure to an alkaline media of 1.0M NaOH + 0.25M Urea. The measured activity was determined to be extremely pH dependent, decreasing sharply during a change from pH 14 to pH 12/13, but remaining higher than the OER (the currently used reaction) in all cases. Surprinsingly, the catalytic activity was not proportional to the amount of Ni^{3+} sites formed, which suggest a more complex mechanism than previously determined. Nevertheless, chronopotentiometry measurements at pH 14 showed a gain of 120 mV in potential needed to achieve a current density of 50 mA/cm2geo as compared to the OER on the same electrode. Using a tin cathode, formate was able to be produced, unaffected by the presence of urea at the anode at pH 14.

A New Approach to Finding Ideal Play in Poset Games

Alexander Clow, St. Francis Xavier University – MSCS 2020

Poset games are a class of combinatorial game that remain unsolved. Examples of poset game include Nim, Chomp, Subset Take-Away, Divisors and Geography. Wilson and Soltys 2011 proved non-constructively that polynomial time algorithms for finding ideal play on any poset game exists, but with the notable exception of Nim, fast algorithms to find specific ideal strategies are unknown. What is more, formidable computational efforts such as that of Zeilberger 2001 have failed to find any global patterns in even special cases such as 3 by n Chomp. This talk presents original results which classify some positions as winning or losing positions and establish the equivalence of ideal strategies on posets that are seemingly unrelated. We believe these results provide a basis for novel analytical methods of finding ideal play in all poset games.

Lithium Metal vs. Lithium Ion Charging Rates

Matthew Coon, Dalhousie University – AUPAC 2020

One of the longstanding issues surrounding electric vehicles is price vs. range; consumers want a car that is affordable but are not interested in frequent stops for recharging. Replacing conventional lithium-ion (Li-ion) cells used in today's electric vehicles with lithium metal (Li-metal) cells results in an increase in energy density of the battery. This in turn means a cheaper battery pack which can travel a greater distance. However, a new problem arises in the form of cycle life. Li-ion technology has been optimized over the past 30 years, resulting in a battery that can be cycled thousands of times. The same cannot be said for Li-metal technology. The difference between Li-ion and Li-metal cells comes at how charge is stored. In a Li-ion cell the lithium ions travel from the positive electrode and are stored in a negative electrode host. In contrast, in a Li-metal cell the negative electrode host is removed and the lithium ions are plated directly onto the current collector. Ideally this plating remains smooth during cycling however, in reality as the cell cycles the morphology of the plated lithium becomes increasingly porous resulting in a high surface area "mossy" structure. This high surface area lithium precipitates capacity loss and decreases cycle life, therefore, maintaining smoothly plated lithium is critical. In this work we examine how changing the cycling rate of lithium-metal cells affects lithium morphology and cycle life. Finally, we propose an optimized cycling protocol which results in a smooth lithium morphology and increases cycle life by 60%.

Use of Glucomannan Gel to Mimic Salivary Proteins for Evaluation of Astringency for a Low-Cost Sensor System

Sydney Crain, University of New Brunswick – ChemCon 2021

A fast, low-cost method for astringency assessment is developed using glucomannan hydrogel permeation chromatography. Astringency is a term used to describe the dry, puckering, physical sensation resulting from the ingestion of tannin-based compounds. Often confused with bitterness, astringency is a physical sensation rather than a taste, that comes from a variety of foods such as chocolate, red wine, tea, and coffee. The level of astringency or physical sensation of certain foods and drinks can be altered by several factors including pH and temperature. Glucomannan gel is a polysaccharide, that when mixed with water and a mild alkali, will form a gel capable of mimicking the salivary proteins found in the mouth and throat. Astringency levels have been evaluated using a multitude of techniques in the literature. In this project, a new method was developed to assess astringency in red wine and tea in comparison to less astringent liquids such as soy sauce, lime juice, fruit punch, monosodium glutamate solution, and tonic water. The glucomannan gel was prepared and then used to measure the level of astringency of a variety of compounds through serial extractions of the compounds after introduction to the hydrogel. Extraction concentration was determined by optical spectroscopy using a cell phone camera. Principle component analysis and singular value decomposition were then used to analyse the separation profile and to evaluate the variance between more and less astringent compounds. Results show distinct differences in the extraction profile between highly astringent and non-astringent compounds. The method demonstrates the feasibility of this approach for routine measurements.

Susceptibility and Immune Response in Atlantic Salmon (Salmo Salar L.) Farmed, Wild and Hybrid Crosses to Aeromonas Salmonicida Subsp Salmonicida Infection

My Dang, Memorial University of Newfoundland – AFB 2021

Aeromonas salmonicida subspecies salmonicida is the causative agent of furunculosis in several fish species including Atlantic salmon (Salmo salar). Although genetic susceptibility and resistance to A. salmonicida have been documented in salmon, the mechanisms are not well understood. Here, we compared naïve and immunized Atlantic salmon from farmed (North American and European), wild (Northeast Placentia River) and hybrid crosses to A. salmonicida susceptibility. Smoltified Atlantic salmon were intraperitoneally (IP) immunized with formalin-killed A. salmonicida and boosted 4 weeks post-primary immunization. The control consisted of fish IP injected with phosphate buffered saline (PBS). The fish were challenged at 10 weeks post-primary immunization. Naïve fish were i.p. infected with 2.5×10^4 CFU/100 g and the immunized fish were challenged with 4×10^6 CFU/100 g. Samples of tissues were taken at different time points to quantify bacterial loads, IgM titers, and gene expression. We found that naïve wild salmon were significantly more susceptible to A. salmonicida infection than the farmed and hybrid crosses ($p < 0.001$). Colonization of lymphoid tissues by A. salmonicida correlated with fish susceptibility. Expression of il-1β, il-8, il-10, and tlr-5 were up-regulated with a higher expression in farm fish in contrast to wild fish whereas gata-3 and cd8 shown down-regulated in both of farm and wild fish after 10 days post-infection. The expression of igm and igd were up-regulated in farm fish, but down-regulated in wild fish. No differences was found between farmed fish and wild fish in the expression of igt. In contrast to naïve fish, no differences in susceptibility were found between vaccinated fish challenged with A. salmonicida. However, formalin-killed A. salmonicida triggered similar immune protection in Atlantic salmon. This study provides new insights into Atlantic salmon immune response and susceptibility to A. salmonicida infection and immunization.

Roles of Temperature and Blue Light in Aerobic Methane Emissions from Canola Plants

Brooke Dauphinee, Mount Saint Vincent University – AFB 2021

It is now well documented that plants produce methane under aerobic conditions. However, the mechanisms of methane production in plants, its potential precursors, and the factors that affect the process are not fully understood. We investigated the effects of two temperature regimes (22/18oC and 28/24oC; 16h light/8h dark), and three blue light levels (0, 4 and 8 mW cm-2) on growth and methane emissions of canola (Brassica napus cv. 6056). First, seeds were germinated in Petri dishes for one week, then the seedlings were transferred to pots and randomly assigned to one of six experimental conditions. Under each condition, ten plants were grown for 21 days, then they were harvested and their growth and physiological traits, including plant dry mass, growth index, photosynthesis, chlorophyll fluorescence, chlorophyll, nitrogen balance index and flavonoids, were measured. Supplemental blue light significantly increased methane emissions from plants, but decreased stem diameter, leaf number per plant, leaf area per plant, leaf, stem, root and total dry mass, specific leaf mass, leaf area ratio, and total chlorophyll content. Other growth and physiological characteristics were not affected by blue light. None of the plant traits were affected by temperature. We found that methane emission was negatively correlated with plant dry mass, leaf area per plant, maximum quantum yield of photosystem II, and nitrogen balance index. In conclusion, blue light stressed plants and enhanced methane emission compared to that of non-stressed plants. Further studies are required to understand the mechanisms of blue light promotion of methane production in plants.

Nutrient Decomposition of Texture Modified Diets in Rural Nova Scotian Long-Term Care Facilities: A Digital Food Photography Assessment

Rebecca Demmings, St. Francis Xavier University – SANFC 2021

Introduction: Undernutrition affects > 40% of residents in Canadian long-term care (LTC) facilities. Undernutrition is the result of inadequate intake of energy, protein, and other nutrients.

Hypothesis: Requiring a texture modified diet (TMD) may be a barrier to adequate nutrient intake.

Methodology: Data were collected from two rural Nova Scotian LTC facilities to analyze menus and compare them to food served and estimated nutrient intakes, via plate waste, of residents utilizing TMD. Using a digital food photography method, before-and-after meal photographs of breakfast, lunch, and dinner for three days was recorded. Nutrient analysis software calculated nutrient provision, served nutrients, and estimated intake. The differences between average planned, served, and consumed nutrients were displayed on a column scatterplot.

Results: Significant differences, $p<0.01$, were indicated between the three-day average planned and estimated consumption of 22 nutrients, including energy, protein, vitamin C, vitamin D, calcium, and zinc.

Conclusions: A trend in significant nutrient decomposition between menu nutrient provision and estimated nutrient intake of residents requiring TMD in Nova Scotian LTC facilities has been identified. This could be problematic as planned TMD menus tend to provide nutrients below the Dietary Reference Intakes. This may create conditions in which residents are susceptible to undernutrition and its effects, including sarcopenia, poor bone health, and impaired wound healing.

The Development of Intuitive Cooperation

Mya Dockrill, Dalhousie University – SAPC 2021

Researchers have used the public goods game to demonstrate that adults are intuitive cooperators, tending to make cooperative decisions faster than self-maximizing ones (Rand et al., 2012). However, little is known about how intuitive cooperation unfolds over development. The present study investigated children's decisions in the public goods games in children (N=64) between the ages of 7 and 12 years. Through an online format, we asked participants to keep or share tokens with their group comprised of cartoon avatars. Participants were randomly assigned to a Condition. In the Pressure Condition, participants were instructed to make the cooperative decision quickly, whereas, in the Neutral Condition, participants were freely able to make their decision. Children in both conditions chose to give their tokens to the group above chance (50%) levels. Behaviour was similar across conditions and age, but there was an interaction between gender and condition where Pressure increased cooperation for females.

The Role of the Adenosine A1 Receptor and HIF1a in the Cross-Tolerance of Danio rerio to Hypoxia and Ammonia

Amy Dodge, St. Francis Xavier University – AFB 2021

Zebrafish (Danio rerio) have been shown to be relatively tolerant to low ambient oxygen (hypoxia) and high environmental ammonia (HEA), two environmentally relevant stressors that tend to co-occur in aquatic environments. Energy balance is important for tolerance to stress, therefore this thesis examined pathways that help regulate energy balance. The signalling molecule adenosine increases during hypoxic events and helps preserve energy through the activation of the Adenosine A1 receptor (A1R). Adenosine also has a relationship with the hypoxia inducible factor alpha subunit (HIF1a), which has an important role in response to hypoxia but can be modulated independently from oxygen. I hypothesize that the A1R and HIF1a play a role in mediating a cross-tolerance to hypoxia and HEA, building on previous work in zebrafish brain. Zebrafish were exposed to four different conditions: normoxia (control), hypoxia, ammonia, and hypoxia and ammonia combined. The fish were euthanized and whole brains were sampled at 0, 2, 4, 8, 16, 32, and 64 h of exposure to measure changes in gene expression over time. Amplification of zebrafish cDNA using PCR targeted housekeeping genes but did not target A1R and HIF1a. Current work is being conducted to optimize PCR conditions to target and amplify the genes of interest before being able to quantify gene expression over time. Further studies are required to confirm the role of A1R in mediating tolerance to hypoxia and ammonia by blocking the receptor in zebrafish and then measuring changes in tolerance by exposing them to the individual and combined stressors.

A Time-Walk Correction Method for the Glasgow Pair Polarimeter Detector

Isabelle Dolan, Mount Allison University – AUPAC 2020

The A2 collaboration at the Institute for Nuclear Physics in Mainz, Germany, collides real photons with nuclei in the photon-energy range of 40 MeV to 1.6 GeV. They focus on experimentally determining polarization observables called polarizabilities via Compton scattering. However, when measuring these polarizabilities, a linearly polarized photon beam is needed. Detectors and experimental methods have reached a level of sophistication such that the photon beam polarization measurement is now the limiting source of systematic error. To remedy this, a team of physicists, led by the University of Glasgow, developed the Glasgow pair polarimeter. This new detector can reach a systematic error of 2% or less after calibration. For comparison, current methods cannot get below 5%. However, this device has the characteristic where one particle can cause multiple hits. This research focuses on the methods used to correct for this phenomenon, called the time-walk effect. The time-walk correction can be done with the Timepix3 chip by taking advantage of the simultaneous measurement of the threshold crossing time and the event energy. The results for the corrections done on data from beamtimes in Mainz have provided encouraging results. Once completed, the pair polarimeter would be used at the A2 Collaboration and other similar facilities.

Designing and Simulating Wavelength Shifting Geometry in an Active Helium Target

Isabelle Dolan, Mount Allison University – AUPAC 2021

Scalar polarizabilities are fundamental characteristics closely related to the internal structure of nucleons. While the polarizabilities of the proton have been well studied, the neutron remains elusive due to the lack of a free-neutron target. Based at the Institute for Nuclear Physics in Germany, the A2 Collaboration has proposed a new active helium target filled with helium isotopes that would allow better access to the neutron. This design would allow for the collection of scintillation light within the active volume, which would reduce backgrounds. The blast of photons emitted from each collision are in the vacuum ultraviolet, while the silicon photomultipliers used only detect in the 200-900 nm range. Thus, a wavelength shifting material is needed. This research examines potential configurations of wavelength shifting fibers to be placed within the target and simulates the light collection and output of each design. Monte Carlo and Geant4 simulations have been carried out to compare scintillation light collection between prototypes. Once the target is built, the neutron scalar polarizabilities can be applied to help explain quantum chromodynamics in the non-perturbative region.

Paleoenvironment Reconstruction of the Cambrian-Ordovician Boundary of Western Newfoundland Using Petroleum Biomarkers and Carbon Isotope Chemostratigraphy

John Mishael Dooma, Saint Mary's University – AUGC 2019

For this study, we have investigated marine carbonates and shales deposited as rhythmites from the lower Shallow Bay Formation and upper Green Point Formation of the Cow Head Group spanning the Cambrian-Ordovician boundary in western Newfoundland. Eighteen carbonate and shale samples were collected and processed for their hydrocarbon biomarkers. The resulting solvent extracts were analyzed using comprehensive two-dimensional gas chromatography-mass spectrometry (GC√óGC-MS). Several petroleum biomarkers such as n-alkanes, acyclic isoprenoids, steranes, hopanes, and aromatic hydrocarbons were quantified. These biomarkers are used as parameters to reconstruct the paleodepositional conditions of the depositional environment, degree to which biodegradation has effected the preservation of the resulting sedimentary organic matter, and thermal maturation of the extractable hydrocarbons. Pristane/Phytane (Pr/Ph) ratios of the sediment samples range from (~1.3 to ~3.4), indicating that the organic matter was deposited under oxic to suboxic conditions. A comparison of the Ph/n-C18 and Pr/n-C17 suggests the organic matter is derived from mixed Type II/Type III kerogen. The sediments also contains C27, C28, C29 Œ±Œ≤Œ≤- and Œ±Œ±Œ±-steranes 24(S+R) and Œ±Œ≤- and Œ±Œ≤- diasteranes in which the C29 stigmasteranes dominate. Gammacerane, formed from the biological precursor, tetrahymanol found in ciliated detritivores that commonly thrive in marine stratified water columns was also detected. Gammacerane Index (GI) values are low, ranging from ~0.82 to ~3.5, indicating there is no stratification in the water column during sediment deposition. The ratio of 25-norhopane and C30 ‚çÒûõΩ + C31 ‚çÒûõΩ 22(S+R) hopanes shows minimal biodegradation on the samples. Maturation of source rocks was assessed by monitoring the ratio of trisnorneohopane (Ts) and trisnorhopane (Tm) as well as C31 ‚çÒûõΩ homohopane S/(S+R). Ts/(Ts+Tm) and C31 ‚çÒûõΩ S/(S+R) values are 0 to ~0.68 and ~0.45 to ~0.54, respectively. These low values indicate the organic matter in most of the samples is early to moderately mature. Samples with the highest range of Ts/(Ts+Tm) 0.57 to 0.62 likely experienced the main phase of oil generation. The Œ¥13C profile across Shallow Bay Formation and Green Point Formation shows alternation of positive and negative Œ¥13C excursions (SPICE event, post-SPICE event, and HERB or TOCE event). Changes in organic matter ratios are observed by using steranes/(steranes + hopanes) (%) and Pr/Ph ratios. Distinct negative shifts of values for the two parameters correspond to negative Œ¥13C excursions during SPICE, post-SPICE, and HERB events. At the Cambrian-Ordovician boundary, there is a sudden increase in Pr/Ph ratios that may indicate other inputs of biomolecules from the upper strata. Looking at ratio of steranes/(steranes + hopanes), there is a decrease in percentage at the boundary that may be linked to eustatic sea level change (e.g., Lowstand System Tract).

SphereSkeletons: Sphere-mesh Fitting for Extracting Topologically Accurate Medial Skeletons from Point Clouds

Lawrence Daniel Doucett, Saint Mary's University – MSCS 2019

We investigate into the problem of 1D skeleton extraction from 3D scans of objects acquired via volumetric capture or LiDAR sensors. Skeletons are one of the most compressed shape representations which aid in simplifying and optimizing 2D/3D graphical objects in animations and modeling. We use sphere mesh representations to approximate the entire shape from a 3D scan. A sphere mesh is a hybrid geometric representation that exhibits the properties of an implicit surface as well as simplicial complex representations. The algorithm constructs the skeleton of a shape from edges of the sphere mesh that approximate the scan, where the sphere mesh is constructed through a set of maximally inscribed empty balls (MEB) fitted onto the point cloud and a nearest neighbor search. A minimal spanning tree is used to prune off extraneous edges from the skeleton. Edges of over-lapping spheres are given much lower weight in the graph as a stability metric. Skeletons, thus created consist of a set of spatial line segments that do not intersect except at the endpoints and capture the shape topology. This paper presents the 2D proof of 16 concept with a few preliminary results that will be extended to 3D. The reconstructed skeletons will further facilitate the recovery of the original shape from the point cloud by connecting the spheres via tangential planes, or tangent lines in 2D. This research will ideally allow for more efficient real time rendering and tracking of 3D objects, which is an integral part of modern VR/AR applications.

Domineering in Misère Play

Aaron Dwyer, Michael Willette, Memorial University of Newfoundland, Grenfell – MSCS 2019

In combinatorial game theory, misère play is a set of rules in which the first player who cannot make a move is the winner. Games under this rule set are complicated to analyse, as many of the algebraic properties of normal play, in which the first player who cannot move loses, are not present. This talk will take a look at the combinatorial game Domineering under misère play, and explore both the difficulties encountered and methods used in finding results under certain restrictions.

An Electrochemical SERS Investigation of Phenolic Compounds Present in Yellow Lake Pigments

Maddison Eisnor, Saint Mary's University – ChemCon 2021

The identification of natural organic pigments is important for the conservation, preservation, and historical interpretation of artwork.   Analysis of natural dyes can be problematic by issues such low concentrations and the sample's complexity because of the fugitive nature of these dyes. In addition, these pigments are exceedingly complex, and often these mixtures are challenging to analyse without a separation step involved. A particularly challenging class of dyes are the natural yellow polyphenols (i.e., quercetin, rhamnetin, emodin, etc.). Several techniques have been used successfully for the identification of phenolic compounds in a complex mixture, but most of these methods require sophisticated instrumentation and a separation step. In addition, these methods may lack the sensitivity needed to detect small amounts of pigment remaining in a faded artwork. As a result, there is a need for innovative methods of analysis which can be applied to the interpretation of artworks containing natural dyes. In this work, cost-effective screen printed electrodes (SPEs) modified with silver nanoparticles (AgNP) were used to amplify the SERS response of phenolic compounds. Application of a voltage to the SERS substrate allows for a fine-tuning of the SERS signal, and is successfully used to characterize multiple dye components in a complex sample. To our knowledge, this work represents the first electrochemical surface-enhanced Raman spectroscopy (EC-SERS) study of phenolic dye mixtures. This work establishes EC-SERS as a useful technique for the identification of natural dyes in culture heritage objects and may be an important tool to the conservation of artwork.

Visible Light Mediated Refinery Waste Degradation using Noble Metal Nanoparticle/Niobium Oxide Composites

Megan Ethier, St. Francis Xavier University – ChemCon 2021

Refinery waste treatment has been a strong subject of interest in the oil and gas industry. While current methods mainly rely on filtration and adsorption, problems in treatment occur when many polyaromatic hydrocarbons (PAH) appear in refinery effluents. Recent studies have used bacterial-mediated oxidation treatments using superoxide, hydroxyl, and peroxyl radical reactive oxygen species. However, the high NaCl concentrations in refinery wastewater is detrimental to microorganism survival. A potential solution to this issue is semiconductor photocatalysis and advanced oxidative processes (AOP) using visible light because the catalyst can be recycled, the use of light energy and removal of harsh chemical oxidants. Reports have shown the capability of photocatalytic degradation over TiO_2 to an environmentally appropriate level, but most trials are inefficient and time consuming. Cost effective PAH degradation remains to be an ongoing issue. Consequently, refinery waste continues to pose a threat on human health and the environment. The current goals of this work are two fold and will be discussed in this presentation: 1) Create a variety of mixed noble metal nanoparticle semiconductors to assist in catalyzing refinery waste decomposition using AOP and the visible light spectrum. The fabrication of gold nanoparticles (green light) and cuprous oxide nanoparticles (blue light) on potassium niobium oxide will be the materials of interest. Potassium niobium oxide is used to allow the catalyst to be more effectively recycled due to its larger particle size and also due to its layered structure to limit PAH diffusion and improve access to catalytic active sites, in contrast to the drawbacks associated with TiO_2. Nanoparticles will be used to extend the light activation into more favourable visible wavelength regions and away from the less desirable UV activation of metal oxide semiconductors. 2) Test the abilities of the gold and copper nanoparticle catalysts to photodegrade PAH. Current work has successfully shown a sixty percent degradation of several polyaromatic hydrocarbons, including fluorene, over a seven-hour period using the gold catalyst. AOP with hydroxy radicals was therefore proven effective. Ongoing work is being done to test the photocatalytic abilities of the copper nanoparticle catalyst since it is more cost effective and attempt to improve upon its major drawback – that the catalyst is easily oxidized.

Magnetics Study within the Valentine Lake Gold Property, Newfoundland and Labrador

Marie Flanagan, Memorial University of Newfoundland – AUGC 2020

Marathon Gold Corporation's Valentine Lake Property is located in west central Newfoundland. The property has four known gold deposits in early exploration stages along 20 kilometres of north-east to south-west trend. It is a future site for an open-pit gold mine, and upon completion, will be the largest gold mine in Atlantic Canada. The Valentine Lake property contains orogenic-type quartz-tourmaline-pyrite veins which are gold-bearing. These veins are structurally controlled, occurring along or proximal to the Valentine Lake Shear Zone. The mineralization is mostly on one side of the shear zone in intrusive rocks, and is rare in the conglomerate on the other side. The area has considerable basaltic dykes, which show up well when conducting a magnetic survey due to their proportions of magnetite. Though their relationship to the mineralogy is uncertain, these dykes can help indicate structure. In a complex area such as the Valentine Lake Property, geophysical surveying can help interpolate the data between drill holes. A large-scale magnetics survey was completed over a portion of the shear zone in 2014, however it was unable to resolve the geometry of the boundary in a key location. To further constrain the location of the shear zone (and hence the mineralized region), a detailed magnetics survey was conducted over a 200m x 300m section in this key location using a GPS enabled Overhauser magnetometer. In this study, total magnetic intensity maps will be created and further processed using pole reduction and first vertical derivative computation. Magnetic susceptibility measurements of surrounding rock types were taken to supplement data provided by Marathon Gold. These data in addition to data from the three drill cores from the survey area will be used to create a three-dimensional structural model.

Impacts of Sediment Chemistry on the Amphipod *Corophium volutator* in the Bay of Fundy

Mia Francis, University of New Brunswick, Saint John – AFB 2021

The effects of eutrophication-induced acidification on coastal sediment and infaunal invertebrates are understudied. Shell hash has been suggested to increase the concentration of calcite in the benthos and protect calcifying invertebrates from acidification. Green algae, which was expected to decompose and decrease sediment pH, and shell hash were applied to the substrate of a mudflat to investigate effects on the amphipod *Corophium volutator*. Sediment pH and *Corophium* abundance, body length, and wet weight were measured over two months. The addition of green algae had no effect on the pH while added shell hash stabilized pH change with sediment depth. This stabilizing effect suggests that shell hash may mitigate sediment acidification. *Corophium* abundance was unaffected by either treatment but *Corophium* wet weight increased at high algae abundance. Further research is necessary to explore the extent to which *Corophium* may be resilient to sediment acidification.

On the Best Thermoelectric

Luke Fraser-Leach, Dalhousie University – AUPAC 2021

There is interest in increasing the efficiency of thermoelectric materials for their practical applications. We attempt to set a theoretical upper limit on P F and ZT, two measures of theroelectric performance, by determining the optimal transport distribution function (TDF) for these two figures. The question of the optimal TDF for thermoelectrics was first addressed by Mahan and Sofo in their work "The best thermoelectric". In this presentation, I discuss why their answer is incomplete and present our answer to their question.

Human Milk Total Thiamine Concentrations Among Rural Cambodian Women on Various Thiamine Supplementation Regimes, 12 Weeks Postnatal

Jelisa Gallant, Mount Saint Vincent University– SANFC 2020

Introduction: Thiamine deficiency and infantile beriberi remain public health concerns in Cambodia and other regions where thiamine-poor white rice is a staple food. Lactating women with low thiamine intakes produce milk containing little thiamine, putting their exclusively breastfed infants at high risk of deficiency. Thiamine deficiency among infants can cause potentially fatal beriberi, or sub-clinically, may impact cognitive development and neurological functioning. Little is known about milk thiamine concentrations in the exclusive breastfeeding period, specifically at 3 months when infantile beriberi-related mortality trends peak. Investigating the impact of various, long-term, low dose, supplementation regimes on human milk thiamine concentrations, may help to inform future interventions to combat maternal and infantile deficiency in Cambodia and other beriberi-endemic countries.

Research hypothesis (HA): There will be a difference in total milk thiamine between treatment groups; milk from women in the 10mg group will be highest and milk from women in the 0mg group will be lower. Objective: To report, and assess difference in, milk total thiamine concentration at 2 and 12 weeks postnatal.

Methods: This study was part of a larger, 22-week double-blind, four-parallel arm, placebo-controlled randomized trial of thiamine supplementation (NCT03616288). 335 lactating women in Kampong Thom, Cambodia were randomized to consume one capsule containing 0, 1.2, 2.4, or 10 mg thiamine daily between 2 and 12 weeks postpartum. At 2 and 12 weeks postpartum, a full milk expression was collected. Milk thiamine concentrations were measured by HPLC-FLD.

Results, Discussion & Conclusion: Will be presented at the conference.

The Effect of Call Similarity on Call Discrimination by Tree Swallow (Tachycineta Bicolor) Nestlings in the Presence of Noise

Nina Garrett, Dalhousie University – SAEC 2021

As the extent of noise expands with urbanization, so does the extent of its impacts on wildlife. The impact of noise is of particular concern when it comes to the disruption of avian communication. Birds, which are especially vulnerable during the nestling stage of their life, rely heavily on acoustic communication. While they can recognize calls in noisy environments, little is known about how call similarity impacts nestlings' call recognition in such environments. My study attempts to answer the question: How does call similarity impact the call discrimination of nestling Tree Swallows (Tachycineta bicolor) in the presence of noise? Using data collected in 2016 as part of a larger study, my study used Raven Pro and RStudio to calculate the spectrogram correlation and Euclidean distance of 37 call pairings (one parent call and one unfamiliar adult). The nestling response data, rearing treatment (quiet vs. noise), playback condition (quiet vs. noise) and call similarity measures were then used to generate four mixed linear models. Neither call similarity nor noise had a significant impact on the nestlings' call discrimination, suggesting that even when calls are similar and conditions noisy, nestlings can access the call elements necessary for recognition. While this study found no impact of noise on call recognition, noise cannot be ignored especially given its other, more detrimental impacts (eg., cochlea damage). Further research into the exact mechanism used by nestlings and the impacts of inconsistent noise is needed to better understand how nestlings discriminate between similar calls in noisy environments.

Alkali Metal Azanides with a Highly Dynamic Phosphonium Fluorenylide Donor

Tanner George, Saint Mary's University – ChemCon 2021

The reaction of a previously reported phosphine-imine ligand with 9-bromofluorene afforded a phosphonium hydrobromide that, upon deprotonation, affords an enamine tethered to a phosphonium fluorenide. Isolation of various crystals of this enamine and subsequent analysis by single-crystal X-ray diffraction (SC-XRD) showed that both (Z) and (E) isomers occur, which is supported by three dynamic isomers in C6D6 solution which led to this isomerization. Within solution-state NMR spectroscopy the enamine phosphonium fluorenide is the dominant isomer and is also observed within all four solid-state crystal structures. The un-solvated and 0.5(THF, n-hexane) solvate of occur as the (Z) enamine, while co-crystallization of either diethyl ether or 3 molecules of THF resulted in the (E) enamine. The ability to participate in two types of hydrogen bonds between either the methyne or amine protons with THF was observed. Subsequent deprotonation with lithium-, sodium-, and potassium-containing bases yielded metal azanides isolated with co-crystallized THF, Et2O, C6H6 and C6H14, forming mostly monomers. Each alkali metal is chelated by one ligand with a coordinating solvent molecule (Et2O or THF), with the only exception being a potassium complex that lacked a coordinating solvent. This potassium complex has a vacancy filled by a 6-membered fluorenide ring from an adjacent ligand, forming an oligomer. Increasing atomic size was correlated with a decrease (>21°) in the angle between the alkali metal and the ipso-position of the 2,6-diisopropylphenyl (Dipp) substituent bound to nitrogen. These compounds will be used as precursors to prepare potential organometallic Earth abundant metal catalysts.

Renibacterium salmoninarum Chronic Infection and Lumpfish (Cyclopterus lumpus) Immune Response

Hajarooba Gnanagobal, Memorial University of Newfoundland – AFB 2021

Renibacterium salmoninarum is a Gram-positive, intracellular pathogen that causes Bacterial Kidney Disease (BKD) in several fish species. Lumpfish (Cyclopterus lumpus) is utilized a cleaner fish to biocontrol sea lice infestation in Atlantic salmon (Salmo salar) farms. Although BKD outbreaks have yet to be reported in lumpfish, this fish has a potential BKD risk due to R. salmoninarum broad host range and horizontal transmission. In this study, we evaluated the susceptibility and immune response of lumpfish to R. salmoninarum infection. Groups of lumpfish were intraperitoneally (i.p) injected with R. salmoninarum ($1×10^7$, $1×10^8$, or $1×10^9$ cells/dose) or PBS. The infection kinetics and mortality were followed for 98 days post-infection (dpi). Transcript expression levels of 33 immune-relevant genes were measured in head kidney (n=6) of fish infected with $1×10^9$ cells/dose and compared to the control at 28 and 98 dpi. Lumpfish infected with the highest, medium, and lowest doses showed survival rate of of 65%, 93%, and 95%, respectively. Canonical innate immune related transcripts, including cytokines (il1β, il8a, il8b), pattern recognition receptors (tlr5a), iron regulation (hamp), and acute phase reactant (saa5) were up regulated at 28 dpi. In contrast, cell-mediated adaptive immunity-related transcripts (cd4a, cd4b, ly6g6f, cd8a, cd74) were down-regulated at 28 dpi, revealing the immune suppressive nature of R. salmoninarum. However, significant upregulation of cd74 at 98 dpi suggests induction of cell-mediated immune response against R. salmoninarum. This study reveals that lumpfish is susceptible to R. salmoninarum ATCC 33209 and caused a chronic infection with an enhanced cell-mediated adaptive immune response.

Geophysical Characterization Study of Robin Hood Bay Landfill, St. John's, NL

Sarah Greene, Memorial University of Newfoundland – AUGC 2020

The Robin Hood Bay landfill is located in the North-East part of St. John's, Newfoundland. It is the solid waste management facility for the City of St. John's and the greater Avalon region. It was first used by the American Military in the 1940s as a training facility and a waste disposal site before becoming the City of St. John's landfill in 1963. In the past, there have been concerns for leachate drainage from the site into the ocean and also into adjacent streams as for a long period of time there was no bottom liner beneath the landfill to prevent leachate from penetrating the groundwater. In 2006, the landfill underwent a largescale renovation that included adding a geosynthetic cover, creating regulations to residential dumping and adding gas and groundwater monitoring wells to the site. This will be the first geophysical study completed over Robin Hood Bay, which is common practice for other landfills. Our study area covered 2.7 km2. The area has not been infilled with new waste since the 2006 renovation and therefore became an optimal location for a characterization study especially because the cobblestone landfill cap in active areas made it unfeasible for our surveys. However, even in our area which was flat and otherwise grassy, there was still a thick layer of crushed stone that gave us unreadable results from our ground-penetrating radar survey. The subsequent studies performed measured; apparent conductivity, magnetic susceptibility, magnetic field, spontaneous potential, induced polarization, and direct current resistivity. These are all noninvasive geophysical studies which, are an excellent way to interpret the subsurface environment for water flow patterns and any environmentally concerning anomalies such as past disposal of large metal objects. The objective of these studies is to provide an image of Robin Hood Bay's subsurface that may identify any possible environmental concerns and provide a baseline study to compare results with in any future geophysical studies showing changes over time.

Assessing the Implementation of the New Canada's Food Guide Recommendations in Childcare Settings

Imene Hank, University of Prince Edward Island – SANFC 2020

Introduction: Preschool-age children can consume over 50% of their daily calories at childcare centers which rely on Canada's Food Guide to plan and evaluate their menus. It is therefore important to investigate the influence of recent changes in the guidelines, particularly their emphasis on plant-based proteins.

Objectives & Hypothesis: This study aims to assess childcare centers' implementation of the new guidelines, particularly the incorporation of plant-based proteins. It is predicted that childcare centers across Prince Edward Island are struggling to implement the recent changes.

Methods: All eligible licensed childcare centers across PEI were invited to complete a survey on their adoption of the new guidelines and to submit their menus for evaluation.

Results: While recruitment is ongoing, 9 centers completed the survey and 8 menus were analyzed. Preliminary results suggest that childcare centers are aware of the changes to Canada's Food Guide. However, they struggle to implement them and incorporate plant-based proteins into their menus due to children's refusal to eat them even when offered once a week.

Discussion: Food reluctance and aversion are common among preschoolers which may explain their refusal to consume unfamiliar foods such as beans. Frequent exposure and serving with familiar foods might increase children's willingness to consume plant-based foods and facilitate the implementation of the current food guide.

Conclusion: Childcare centers may require further training and support to implement the new Canada's food guide recommendations, specifically around plant-based proteins.

Developing a SPICE Model for Redox Reactions in Porous Supercapacitor Electrodes

Sammy Hanuka, Dalhousie University – ChemCon 2021

Porous supercapacitors provide a unique balance of power and energy-density by coupling a high surface area with highly reversible (fast) charge storage mechanisms. Unfortunately, supercapacitors can also suffer from irreversible faradaic (redox) reactions that limit their efficiency and waste energy. It is often difficult to isolate and identify the relative contribution of these processes, especially in porous environments, because pores experience non-uniform charge storage and redistribution along their surface. Since tracking the different processes inside a pore is difficult using conventional electrochemical techniques, equivalent electrical circuit (EEC) models have been developed to help further our fundamental understanding. These EECs are often modelled using simulation programs with integrated circuit emphasis (SPICE). Currently, de Levie's transmission line circuit (TLC) is commonly used to model potential and charge movement in pores; however, faradaic reactions have not yet been accounted for. To date, faradaic EECs have only been modeled on planar surfaces, limiting their applicability towards porous supercapacitors. This work is the first to use a TLC in order to model both faradaic reactions and capacitive charge storage together within an electroactive pore. A faradaic reaction EEC is incorporated as a branch nested within each TLC segment. Circuits are evaluated against manganese oxide (MnOx) supercapacitors through simulated cyclic voltammetry (CV) experiments. The unified pore EEC model is shown to be significantly more accurate in modelling irreversible processes in MnOx. This model can help isolate the relative contributions of the irreversible reactions limiting MnOx and other porous supercapacitors.

Food Use, Food Security and Food Production and Sales Across Growing Seasons Among Rural Kenyan Women

Julia Heckbert, University of Prince Edward Island– SANFC 2020

Objective: To assess the effect of growing season on food insecurity and food consumption, as well as association between homestead food production and sales, food consumption and food security among rural Kenyan women.

Background: University of Prince Edward Island and Farmers Helping Farmers, a PEI NGO have implemented horticulture and food-based nutrition education programs since 2010. While interventions have been associated with improved food insecurity, the impact of seasonality has not been considered. Further, the impact of homestead food production and sales on women‚Äôs food consumption and food security has not been assessed.

Methods: In-home surveys were used to assess domains of food insecurity using the Household Food Insecurity Access Scale (HFIAS); food consumption was assessed using a food frequency questionnaire and homestead food production and sales was self-reported (n=66). Data was collected over two growing seasons (lean and post harvest) from May-Aug 2019. The proportion of food insecurity between growing seasons was assessed with chi square analysis. Growing season, food consumption, food production and sales will be assessed using chi square analyses.

Results: There was a higher rate of the quantity domain of food insecurity in the lean growing season (78%) compared to post harvest (52%) (p=0.02). There were no differences in food security related anxiety or food security related food quality. Differences in food use and food production/sales will be shown in the presentation.

Conclusions: Preliminary results suggest food insecurity rates may be influenced by season which has implications for the design and evaluation of future food-based interventions.

Synthesis of Picolyl-Substituted Imidazolium Salts for Metal-Organic Frameworks and Beyond

Jacob Hoare, Saint Mary's University – ChemCon 2021

Due to their porosity, high internal surface area, and tunability, metal-organic frameworks (MOFs) have a broad range of potential applications; one of the most common being gas separations. Carbon dioxide is a major environmental pollutant, and carbon dioxide capture technologies are in high demand; thus, MOFs that efficiently, selectively, and reversibly absorb carbon dioxide could be very useful. We are investigating a series of picolyl-substituted imidazolium salts with the ultimate goal of preparing an N-heterocyclic carbene functionalized, hexafluorosilicate-pillared ionic MOF (iMOF) for carbon dioxide capture. However, the target ligands have applications beyond synthesis of iMOFs. Recent results and progress, current avenues of study, and future directions are discussed.

Synthesis and Characterization of β-Cyclodextrin: Essential Oil Inclusion Complexes for Tick Repellent Development

Jenny Hogenbom, Acadia University – ChemCon 2021

Ticks are an issue of concern for anyone who enjoys the outdoors as vectors for transmission of many diseases, such as Lyme disease. Essential oils are used in several pest management applications and have been successfully employed in developing tick repellent products. The volatile nature of these oils causes them to evaporate rapidly, requiring protection to extend duration of tick repellency. In this study, the β-cyclodextrin (β-CD) inclusion complexes (ICs) with three different tick-repellent essential oils (EOs) were investigated. ICs were characterized with several methods, including evaluating the concentration of EO in the product. The volatile release over time from the ICs was investigated by SPME-GC-MS analysis. The IC formation positively impacted EO volatile release in the lemongrass IC, allowing a constant release of volatile compounds. ICs were tested for tick repellency and significant repellent activity was observed, with up to 90% repellency. The results demonstrated that β-CD has selectively encapsulated different EOs and the corresponding release profiles are linked to the chemical properties of EO components. The inclusion complex formation may improve EO tick repellent properties and provide a better, long-lasting repellent.

Understanding Resistance to Flood Mapping: a Test of Climax Thinking in Southwestern Nova Scotia

Samantha Howard, Dalhousie University – SAEC 2021

As a result of climate change, flooding is projected to become more severe and frequent. Flood mapping demonstrates areas of past and potential future flooding, and allows for informed decision-making regarding personal and community planning. However, there has been resistance to flood mapping, with opponents citing potential decline of property values. This thesis explores resistance to flood mapping through the lens of climax thinking. Climax thinking considers why, when faced with proposed land changes, people exhibit resistance, allowing for better understanding of the prevalence and nature of resistance to change. The questions guiding this research were: (1) What are the major concerns of residents regarding the rollout of floodplain mapping? and, (2) How can climax thinking be used to understand these concerns? To address these questions, surveys were administered in Liverpool and Bridgewater. The focus of the survey was to understand flood experiences and opinions in these regions. This presentation will focus on a preliminary analysis of the data, which shows that approximately 1/3 of the respondents in these communities have experienced flooding, yet the majority have not seen a flood map, nor are they concerned about the impact of flooding in the near future. It is anticipated that the final analysis of the data, using the lens of climax thinking, will address the underlying reasons for resistance to publicly available flood mapping in the region. These results will be beneficial when rolling out provincial flood mapping in a manner that will be accepted by individuals and communities.

Microanalysis of quartz and carbonate hosted fluid inclusions associated with polymetallic mineralization (Fe-Co-Ni-Cu-As-Ag-Sb-Au-Pb), of the Cape Saint Mary's, Lansdowne and Nictaux Falls dam occurrences in the Meguma Terrane, Nova Scotia

Joshua Jackman, Saint Mary's University– AUGC 2020

Quartz-hosted fluid inclusions (FI) of three metasediment-hosted polymetallic occurrences [Nictaux Falls (Co-Ni-As-Au-Bi), Lansdowne (Zn-As-Ag-Sb-Au-Pb) and Cape Saint Mary's (Co-Ni-Cu-Zn-Ag-Sb-Au-Pb-Bi)] in the southwestern Meguma Terrane, Nova Scotia, are currently under investigation. Similarities in both host rock-type, alteration, and metallic mineralogy suggest a possible genetic link; therefore, this work will establish the P-T-X of fluids associated with all three sites to confirm their genesis. Lansdowne FI are classified into three types: type-1 inclusions are single-phase liquid inclusions and exhibit an elongate, subhedral shape; type-2 inclusions are liquid-rich, two- or three-phase (liquid+vapour or liquid+liquid+vapour), and exhibit an array of shapes (negative crystal, rounded elongate, irregular); type-3 inclusions contain a single vapour phase and also exhibit varied habits. All inclusion types may occur in the same assemblage, suggesting fluid mingling or boiling. Cold cathodoluminescence confirms that FI are hosted in secondary quartz that surrounds euhedral/subhedral primary quartz grains and is coeval with mineralization. Confocal Raman microspectroscopy determined that type-1 are H_2O-dominant, with trace CH_4; type-2 FI contain H_2O liquid with a carbonic (CH_4 and/or CO_2) vapour phase; and type-3 inclusions contain predominately CH_4. Microthermometry of Lansdowne FI yield final ice melting temperatures (TMice) for type-1 and -2 inclusions, and homogenization temperatures (Th; to single-phase) for type-2 and -3 inclusions. Type-1 inclusions show TMice between -20 and -24°C (n=17), suggesting a high salinity aqueous fluid, at or near halite saturation, and high divalent cations such as Ca^{2+}. Type-2 inclusions show TMice between -8 and -4°C (n=35), suggesting a low-salinity fluid (12 - 6 wt% NaCl equivalent). Most type-2 inclusions decrepitated upon heating except for some CH_4-poor inclusions, which exhibited Th from 229 - 261°C (n=7). Type-3 inclusions homogenized to CH_4 vapour by dew point transition between -110 and -92°C (n=8) suggesting entrapment at extremely low pressure. This preliminary work suggests mingling between a low-salinity brine and CH_4 near surface during Lansdowne mineralization. Ongoing and future work will continue to characterize samples from Lansdowne, as well as Nictaux Falls and Cape Saint Mary's, using the methods listed above. Decrepitate mound analysis will also characterize the cation and anion chemistry of the paleofluid associated with mineralization.

Burnout and Job Satisfaction in a University Context: Does Self-Compassion Matter?

Hannah James, Mount Allison University – SAPC 2021

Being satisfied with one's job has a profound impact on institutions and individuals. Research highlights that stress and burnout are robust predictors of decreased job satisfaction. The present study examined the role of self-compassion with these constructs. 102 university personnel ranging in age from 23 to 65 years (M = 45.66, SD = 11.68) completed an online survey to indicate their degree of stress, burnout, job satisfaction, and self-compassion. Using multiple regression analyses, I first replicated past research and showed that increased stress was related to lower job satisfaction, in part because of its relationship with burnout. Building on past research, results also showed that self-compassion was associated with low stress which, in turn, was associated with lower burnout. Although self-compassion was not directly related to job satisfaction, the results highlight the need for researchers to examine the role of self-compassion in populations beyond the healthcare sector.

Développement des Sondes DGT Spécifiques à L'Échantillonnage du Radium dans les Eaux Naturelles

Marwa Jebali, Université de Moncton – SAEC 2021

Le radium est souvent considéré comme un indicateur d'impact environnemental des industries minières, gazières et nucléaire. L'intérêt pour cet élément radioactif porte également sur sa toxicité et sa capacité à être accumulé par les organismes vivants en se substituant au calcium. Les défis de la surveillance environnementale de ce radionucléide dans les eaux naturelles résident dans sa faible concentration et la détermination de sa spéciation, c'est à dire sa fraction biodisponible. C'est dans ce contexte que nous souhaitons développer des sondes DGT (Diffusive Gradient in Thin film) spécifiques au radium : ces échantillonneurs passifs dont le principe repose sur la diffusion contrôlée de l'élément à travers un gel jusqu'à une résine accumulatrice imitent la bioconcentration des contaminants par des organismes sentinelles. Nous avons testé la rétention et l'élution du radium par des gels de polyacrylamide et d'agarose à base des résines TK100, AG50W-X8, Chelex-100 et MnO2 avant de les intégrer dans des sondes DGT. Les résultats démontrent l'efficacité de la rétention du radium dans l'eau Milli-Q par les résines. Néanmoins, dans l'eau de rivière, les ions compétiteurs affectent la rétention du radium par les DGT mais favorise sa désorption lors de l'élution. Seule la TK100 préconcentre efficacement le radium dans les eaux naturelles. Cependant, son intégration au sein des sondes DGT n'est pas recommandée car les mêmes ions compétiteurs affectent les mécanismes et la vitesse d'échange du radium à la surface de la résine.

Combating White-Nose Syndrome Using Fungus-Derived Inhibitory Compounds

Jennifer Kolwich, Saint Mary's University – ChemCon 2021

In 2007, White-nose syndrome (WNS) emerged as a deadly disease in North American bat populations (1). Since the first documented cases, WNS has spread to 35 states and seven provinces, leading to population losses of over 95% in some sites (2). The disease is caused by an infection of the wing tissue with the invasive fungal pathogen Pseudogymnoascus destructans (Pd) (1). Recent studies have supported the idea that micro-ecological defenses of native bat-associated microbes could be the key to limiting the infection and spread of this deadly fungus (2). To find candidate microbes, samples from a colony of bats and cave sites in Eastern Canada were collected and isolated. These purified strains underwent pairwise assays against Pd and three related Pseudogymnoascus species to test for inhibitory activity. The metabolites of an isolated Penicillium species from one of the cave areas shows potent inhibition of Pd. The extracted metabolites show strong potential as a WNS therapy, as they display specific activity toward Pd and other non-native fungal species, but limited effect on other native cave and skin microbes. This presentation will outline the methodology that helped uncover the nature of the Penicillium strain's activity, elucidate the structure of active biomolecules, and identify potential biological pathways of Pd that are being impacted by the extracted metabolites. 1. Blehert DS, et al. Science, 2009, 323, 227. 2. Hoyt JR, et al. Nat Rev Microbiol., 2021, 19(3), 196-210.

Cape Breton Abuzz: Naturalists Amass Data About Bumble Bees

Hannah Kosick, Cape Breton University– SAEC 2021

Keen amateur naturalists can identify bumble bees (genus Bombus) and provide valuable data. An open, online learning guide to educate youth and eager naturalists about Cape Breton bumble bees is used to increase the effectiveness of citizen science data collection. This guide provides educational supports and fosters a passion for environmental stewardship. The effectiveness of citizen science iNaturalist data on bumble bees is compared to data collected by experienced naturalists (those who study Bombus) in Cape Breton. A higher proportion of citizen scientist observations were research grade than those from experienced naturalists throughout the same time period. More than 90% of citizen scientist observations were identified to at least bumble bee by the observer. Researchers can look to citizen science data collection as a cost-effective means of gathering quality data from large areas in a short amount of time. Future research could test how successful the online educational guide is in further increasing the effectiveness of citizen science data collection. Research could also examine how education increases the value of iNaturalist observations and how that influences conservation efforts.

Food Insecurity, Mental Health Service Use, and Medical Healthcare: The Role of Depression

Allyson Lamont, University of New Brunswick, Saint John – SAPC 2021

Millions of Canadians report insufficient access to food. Research suggests that food insecurity is associated with increased use of medical healthcare services, but decreased access to services. People who are food insecure report various negative health consequences, such as depression which itself can affect healthcare access. Additionally, it is unclear if such people access mental health services differently than food secure individuals. The current study investigated the relationships between food insecurity and mental health service use, healthcare service use, and barriers to accessing healthcare, while exploring depression as a mediator. Data was obtained from the results of the 2013-2014 Canadian Community Health Survey (minimum n = 397). Results indicated that depression acted as a partial mediator between food insecurity and several outcomes: accessing medical services for a diagnosis or consultation, accessing mental health services, and visiting a general practitioner about mental health. The current study makes headway for future research.

Surf'n Bake: Exploring the Sensory Characteristics of Seaweed Composite Bread

Tim Lamont, Acadia University – SANFC 2020

Seaweeds have been eaten in the diets of coastal cultures for centuries, however consumption of seaweeds has seen limited interest in Western diets due to arguably undesirable sensory characteristics and lack of familiarity and accessibility. Apart from healthful bioactive metabolites, seaweeds are good sources of fiber, protein, minerals, nearly a complete protein, and have a low fat content (mainly mono or polyunsaturated). The objective was to investigate if brown seaweed, Ascophyllum nodosum, or red seaweed, Chondrus crispus, could be feasibly added to bread. Additionally, to determine how, if at all, brown or red seaweed alters the sensory properties of whole-wheat bread and to determine at what percentage flour the addition of brown or red seaweed to whole-wheat bread is acceptable to consumers, if at all. The two seaweeds were incorporated into separate batches of whole wheat bread by percentage weight flour at 0% (Control), 2, 4, 6, and 8%. The samples were presented to consumers (n= 54 and 64) to determine the sensory characteristics and the overall liking of the breads. A.nodosum and C. crispus breads were acceptable at the 4% and 2% levels, respectively. The attributes of no aftertaste, soft and, chewy drove consumer liking of whole wheat bread; while attributes dry, dense, strong aftertaste and saltiness detracted from liking. The significance of this project is to demonstrate the acceptability of seaweed in a western population which may lay ground work to encourage and promote the consumption of seaweed or to exemplify seaweed incorporation into foodstuffs.

Evaluation of the Longevity, Antibacterial, Antioxidant, and Anti-inflammatory Efficacies of Honey Extracted from Lozenges

Petra Larsen, University of Prince Edward Island – ChemCon 2021

Honey is a well-loved and natural food product, which in addition to being a good alternative to processed sugar, also has many associated health benefits. These benefits include a variety of activities, such as antibacterial, antifungal, antioxidant, anti-inflammatory, and probiotic efficacies. Honey from different floral or regional origins can have differing chemical and biological profiles, which ultimately impacts the extent to which a type of honey can exhibit these beneficial properties. It is also possible to consider changes between unprocessed honey and honey products, such as skin-care and cosmetics, or food products, including candies and jams. It is an important factor for both consumers and vendors that these honey products maintain their beneficial health properties. The objective of this project is to evaluate the chemical, biological, and health properties of honey that has been extracted from lozenges.

Examining CO2 Sequestration Potential and Subsequent Mineral Carbonation in Ultramafic Rocks from the Baie Verte, NL Area1

Kayla Lawrence, Memorial University of Newfoundland – AUGC 2019

As atmospheric carbon dioxide (CO2) levels continue to rise due to anthropogenic influence, developing long term ways to capture and store CO2 are important for preventing accumulation in the atmosphere and further harm to the biological processes that take place on Earth. One possible long term storage option is through carbon mineralization; a naturally occurring process that can sequester CO2 from the atmosphere and store it in the form of stable, solid carbonate minerals. This type of reaction happens naturally at sites of serpentinization due to the groundwaters that are present in these areas. Type I waters have a meteoric origin and are enriched in Mg2+ and HCO3- ions, whereas Type II waters are rich in Ca2+ and OH- and develop when Type I waters are isolated from the atmosphere. In this study, we will use laboratory experiments to determine whether the ultramafic rocks collected in Baie Verte, Newfoundland, have the potential for carbon mineralization. The rock samples will be crushed, mixed with simulated Type I or Type II waters, and placed in the LI-COR flux chamber which will measure any change in CO2 gas concentration throughout the duration of the experiment. For each experiment, a total of four water samples will be taken, two at the start and two at the end, to determine any change in total ions, specifically Mg2+ and Ca2+, in solution and a change in the total inorganic carbon. The pH and conductivity of the solution will also be measured at the beginning and end of the experiment

Designing 3-Magnet Arrays with MATLAB

Maggie Lawrence, University of New Brunswick – AUPAC 2021

Permanent magnets have a variety of uses, such as in motors, imaging, electronics, and more. Often, the desired magnetic field for these uses must be constructed from the fields of several individual permanent magnets. The permanent magnets may be placed in an array, positioned and oriented relative to each other in such a way to create fields customized for their purpose. Strong magnetic fields are hazardous and often impractical to work with. Strong inter-magnet forces in the array can displace the magnets and disrupt the field. Strong fields arise from using many, large magnets together. Therefore, it's desirable to use small magnets. This project will describe the use of MATLAB to design an array of three magnets, all polarized in the same direction, with a constant magnetic field gradient parallel to the direction of polarization, for use in MRI.

General Game Playing with Deep Reinforcement Learning

David Leblanc, Acadia University – MSCS 2020

Patient Experience with Home-Based Gestational Diabetes Education during COVID-19: A Satisfaction Questionnaire

Julianne LeBlanc, Mount Saint Vincent University – SANFC 2021

Background: The novel coronavirus disease (COVID-19) has challenged healthcare to adjust education delivery. Many in-person education visits moved online March-June 2019. Prepandemic research indicates distance-based education can benefit both healthcare providers and patients, for several reasons. A Nova Scotia-based diabetes in pregnancy (DIP) clinic (DIP) previously employed a blended model; in-person introductory gestational diabetes (GD) education and online follow-up. In spring 2020, the DIP temporarily moved all education online, including an introductory website with videos, resources, and links. Patient satisfaction is foundational to intervention fidelity and ongoing clinic quality assurance efforts.

Objective: To determine the level of education satisfaction as measured with the Online Education Feedback Questionnaire in patients receiving the existing distance education offered by a Nova Scotiabased Diabetic in Pregnancy Clinic.

Methods: A mixed-form cross-sectional web-based questionnaire (REDCap) was adapted from an existing and pre-tested standardized questionnaire, informed by the Kirkpatrick Model of Effective Education Evaluation. This questionnaire is collecting feedback from patients who have received and are receiving standard care for gestational diabetes. A key aim of this work is to collect and describe DIP patient reactions to the online education and pandemic-related changes to standard care.

Anticipated Results: To date, one patient has started the recruitment process.

Conclusions/Significance: This provider-led survey will provide valuable patient feedback, aimed to inform decisions on introductory education delivery.

Constructing a Coarse-Grained Model for Cross-Linked Collagen Fibrils

Matthew Leighton, Dalhousie University – AUPAC 2020

Collagen fibrils are microscopic molecular ropes that are structural components in many animal tissues. We present an equilibrium coarse-grained model for the structural and mechanical properties of these cross-linked fibrils. We model enzymatic cross-links as anisotropic Gaussian chains, which allows us to approximate their free-energy contributions. We add additional free energy terms for the Frank elastic energy due to the orientation of collagen molecules within the fibril, for the surface tension, and phase-field crystal terms which account for the D-band density modulations observed along the length of collagen fibrils. We computationally minimize the sum of these free-energy terms given an imposed strain field acting on the fibril to obtain equilibrium structures. Using this framework we investigate the effect of strain on various important structural and mechanical properties of the fibril, such as the molecular director field, characteristics of the D-band, and the stress-strain curve.

Examining the Effects of Changes in Solvation Energy and Capillary Forces on the Self-Assembly of Gold Nanoparticles at the Oil/Water Interface

Kate Leslie, Mount Allison University – ChemCon 2021

Developing methods to control the self-assembly of gold nanoparticles (AuNPs) to a liquid-liquid interface is an important field with applications in the development of responsive films, advanced surface-enhanced Raman spectroscopy, and the formation of designer nanoparticle superstructures. Interfacial adsorption of nanoparticles is challenged by their high solvation energies and small van der Waals interactions compared to larger particles. A current model for interfacial nanoparticle adsorption identifies the two main energy parameters of concern arising from attractive nanoparticle-nanoparticle capillary forces and the (repulsive) solvation of the nanoparticles in the two phases. These parameters are strongly influenced by changes to interfacial tension, particle radius, and dielectric constants of the two phases. Herein I will describe the design of an experimental system to test this model with respect to the nanoparticle core size, ligand choice, interfacial tension, and ionic strength. In situ and ex situ analysis of the interfacial films deposited to substrates will be discussed.

Design and Synthesis of a Redox Active Diindane

Alex MacDonald, Mount Allison University – ChemCon 2021

The field of Green Chemistry seeks to reduce the risks and environmental impact associated with chemicals and chemical processes. To serve as guidelines for this purposeful design, Anastas and Warner introduced the 12 Principles of Green Chemistry. One of these principles, catalysis, is key as the use of chemical catalysts eliminates waste that would result from the use of stochiometric amounts of reactant. Many of the most successful and widespread redox catalysts in industry today feature precious heavy transition metals, such as palladium and rhodium, though the toxicity and environmental impact of these metals is undesirable. In contrast to these expensive transition metals, the base main group metal indium possesses several characteristics that make it appealing for Green catalysis. Indium compounds are relatively non-toxic and have potential use as Lewis acid catalysts in aqueous solution. Indium is typically trivalent and not intrinsically redox active, which necessitates the design of indium compounds in lowered oxidation states to impart redox activity. Our recent studies exploring the synthesis and structural characterization of novel diindane compounds in which indium is in the formally +2 oxidation state will be presented.

Epithermal Gold Mineralization and Associated Alteration at the Golden Ridge Deposit, Poplar Mountain Volcanic Complex, southwestern New Brunswick: Analysis of the Role of Pyrite and Arsenopyrite during Mineralization

Moya MacDonald, University of New Brunswick– AUGC 2020

The Poplar Mountain Volcanic Complex, in southwestern New Brunswick, consists of three main volcanic phases: porphyritic rhyodacite, rhyodacitic volcaniclastic rocks, and basaltic volcanic rocks. Previous U-Pb zircon dating indicates that the volcanic rocks formed at 459.0 +/- 3.0 Ma. Gold mineralization was discovered in 1994 and is associated with illitic alteration was also dated using 40Ar/39Ar methods that determined the age of mineralization to be 411.0 +/- 3.7 Ma, thus suggesting it to be considerably younger than the Middle Ordovician volcanic sequence. Based on gold assay data from archived assessment file reports and relogging available drill core, gold mineralization is mainly constrained to the porphyritic rhyodacite. The presence of gold appears to be restricted to areas containing arsenopyrite, and to a lesser extent pyrite, as well as in areas of multiple quartz-carbonate vein stockworks and areas of hydrothermal brecciation. Selected samples were analysed using Instrumental Neutron Activation Analysis, Inductively Coupled Plasma-Emission Spectrometry, and -Mass Spectrometry. Paragenetic examination of the complex veining helped select various pyrite- and arsenopyrite-bearing assemblages for microX-Ray Fluorescence (μXRF) – Energy Dispersive Spectrometry mapping; certain pyrites were chosen based on their size, as well as the Au grades of the samples. Using μXRF, two electrum grains were found within a sample containing 10.2 g/t Au. There is also evidence of some Arsenic zoning in pyrite within a few samples, as well as S-As zoning in arsenopyrite overprinting some earlier pyrite that occurs as disseminations. The purpose of this research is to determine if gold is refractory within pyrite and arsenopyrite or if it is present as free gold or electrum. If the gold is saturated during crystallization of pyrite and/or arsenopyrite, there should be a geochemical association between As, S, and Au, which is evident in the bulk geochemical analyses. Laser Ablation Inductively Coupled Plasma – Mass Spectrometry (LA-ICP-MS) analysis and elemental mapping is planned. Other future work will include Ar-Ar dating of illite from the NE zone discovered in 2011. Although rare, hydrothermal apatite has been identified in several stockwork veins, which may be dated by LA-ICP-MS U-Pb methods to confirm the ages of mineralization.

Using Long Lived Phosphors to Extend the Light Response of Gold Nanoparticle Photocatalysts

Darian MacLean, St. Francis Xavier University – ChemCon 2021

Oxidation reactions remain the most implemented route for both applications, due to their high importance in photoremediation and in the synthesis of pharmaceuticals to plastics. However, traditionally these oxidations are initiated using toxic chemicals, such as chromate or permanganate reagents, that have considerable environmental drawbacks. With respect to sustainability and ecological impact, semiconductors are recognized as being far superior to harmful alternatives, such as chemical oxidants. However, the two main hinderances of semiconductors are their need for UV light to commence chemical activity as well as the use of platinum and palladium precious metals. More recent research deviates away from these unfortunate aspects. One proposed, cost effective, solution is strontium aluminates doped with europium and dysprosium (SrAl $2O4$:Eu2+,Dy3+), also known as persistent phosphors - materials used to formulate long after-glow commercial materials. This complex exhibits remarkable photoluminescent properties, emitting vibrant green visible light. In spite of the clear advantages it bears, it is strikingly underdeveloped in terms of its catalytic applications. A finite number of reports have demonstrated that the UV light response of TiO2 semiconductors have been enhanced with SrAl2O4 materials (SAOs), suggesting that its catalytic activity continues once the light source is removed, a consequence of its long emission activity. Corresponding with these claims, studies conducted recently at our university indicate that more energetically favourable light sources (such as blue and red lights) may possibly yield the same results SAO emission observed using UV light. The current contribution will examine the ability of these visible light active SAO composites to photocatalytically promote oxidation of a series of aromatic alcohols ti improve the sustainability of this process.

Stable Isotope Analysis & Acoustic Telemetry Tracking to Determine Critical Habitat(s) of Yellow-Stage American Eels (Anguilla rostrata) in the Restigouche River and Estuary

Maria Mason, University of New Brunswick, Fredericton – AFB 2021

The American eel (Anguilla rostrata) is a commercial species that is historically important to Indigenous peoples throughout North America. Though once abundant, the species has experienced severe population declines over the past several decades and has been classified as threatened by the Canadian government. Major knowledge gaps exist concerning the ecology of this indicator species. We wanted to determine the critical habitat(s) of yellow-stage American eels in the Restigouche River and estuary in New Brunswick, Canada. Through caudal fin carbon and nitrogen stable isotope analysis of freshwater and estuary origin eels, we found that the eels spent extended periods of time in both freshwater and estuary habitats while only a small proportion migrated between the two once or twice annually. Both the river and estuary should be considered as critical habitats. We also collected passive and active acoustic telemetry tracking data within the estuary from May of 2015 until June of 2016 and found that the eels were most active nocturnally between June and October. The eels preferred coastal areas near sources of freshwater input as diurnal resting sites. Our results can be used to inform future conservation strategies, including coastal restoration projects in the Restigouche River system. It is vital that this economically and culturally significant species continues to be studied as we work to increase its declining population.

Thermomechanical Softwood Pulp Fibers, Filtration, and Personal Protection

Kaleigh McLeod, Saint Mary's University – ChemCon 2021

Now over one year into the COVID-19 pandemic, researchers are faced with finding creative solutions for the ongoing issues that the SARS-CoV-2 virus has caused. People all around the world are doing their best to fight this virus, while they are also being faced with global personal protective equipment (PPE) shortages. Furthermore, current PPE products are mainly sourced through non-renewable feedstocks. In contrast, wood pulp is an abundant and renewable natural resource. Currently, only one Canadian paper mill's wood pulp is used in combination with synthetic polymers, such as polypropylene, to produce non-woven textiles. These non-woven textiles are used to produce 3-ply disposable masks. Sourcing PPE from synthetic polymers alone is problematic because these polymers are produced with the use of solvents that are detrimental to the environment and as single-use masks these polymers accumulate in landfills. In partnership with Port Hawkesbury Paper, this work analyzed Nova Scotian thermomechanical softwood pulp (TMP) for its application in PPE. This pulp is produced in a low effluent mechanical process. TMP was modified with deep eutectic solvents for lignin removal and the filtration efficiency of treated and untreated pulp from various points throughout the paper mill was compared. Wood pulp based PPE would be biodegradable, therefore this would have an enormously positive impact on the population's waste output.

The Mineralogy, Paragenesis, and Petrogenesis of the Polymetallic (Co-Ni-As-Au) Veins of the Nictaux Falls Dam Occurrence in the Annapolis Valley, Nova Scotia

Natalie McNeil, Saint Mary's University – AUGC 2019

The Nictaux Falls Dam Occurrence (NFDO) hosts polymetallic veins (Co-Ni-As-Au) located in the spillway of the Nova Scotia Power Dam along the Nictaux River, Annapolis Valley, Nova Scotia. The mineralogy of the understudied polymetallic veins of the NFDO are investigated in order to describe their petrogenesis. Mineralization is restricted to fault-hosted quartz veins in the Silurian-aged greenschist facies metasediments of the Kentville Formation, proximal to its contact with the Devonian-aged South Mountain Batholith (SMB). Two styles of mineralization are identified: i) laminated sulfarsenide-quartz veins, and ii) quartz breccia veins containing sulfarsenide-mineralized wallrock clasts. The sulfarsenides are spatially associated with wallrock material (chlorite, biotite, rutile, REE-phases) and exhibit unidirectional zoning regardless of mineralization style: early euhedral arsenopyrite cores (50 to 100 ¬µm) are overgrown by a succession of arsenopyrite to cobaltite to gersdorffite. Textural evidence suggests arsenopyrite cores are derived from the wallrock. Unidirectional zoning indicates settling of dense sulfarsenides in the fluid during mineralization. Compositional zoning could indicate the removal of Fe and Co from the mineralizing fluid through progressive sulfarsenide mineralization, or decreasing pH. Late native Au (20 wt% Ag) occurs interstitial to gersdorffite rims of the sulfarsenide accumulations. Sulfur isotope analysis of the sulfarsenides and wallrock sulfides will be conducted in order to constrain the source of S. Bulk rock geochemistry of the metasediments and nearby outcropping gabbro and diabase show high Co and Ni (20-24 and 31-34 ppm Co and 55-71 and 21-107 ppm Ni, respectively), suggesting these rocks as potential sources of metals. In the metasediments, the Co and Ni is primary and hosted in chlorite and sulfides; however, in the mafic rocks the metals are associated with secondary actinolite and sulfides. Mafic enrichment of metals is suspected to be attributed to the fluid derived from the dehydration of metasediments following the emplacement of the intrusives. The metasediments are therefore the ultimate source of metals of the NFDO. Zircon geochronology of the mafic rocks will be used to understand their timing with respect to the SMB and mineralization.

Fatal Attraction? How Land Use Can Influence Community Composition of Atlantic Bumblebees

Naomi Meed, University of New Brunswick, Fredericton – AFB 2021

Bumblebees (Bombus, Hymenoptera: Apidae) are a genus of wild bees currently facing worldwide threat due to urbanization, pesticide use, disease, competition, habitat loss, and climate change. We examined spring bumblebees (n=950) sampled from 43 sites across New Brunswick in 2020, deploying one blue vane trap at each site for two weeks to assess the effect of land use on bee communities for abundance, species richness, and biodiversity. The land types included agricultural (plowed crops), pasture (unplowed crops), forest, and wetland sites, with sites chosen in quantities to match the proportion of that type of land that is present in the province. We identified 9 Bombus species among our samples; Bombus borealis and Bombus ternarius were by far the most common bees, making up 92% of all specimens identified. After testing bee abundance, richness, and diversity against land use with an ANOVA, we found that richness varied significantly across habitats (p =0.03). Instead of seeing reduced numbers in manmade farmland, we saw higher richness and diversity in these sites, in part due to the presence of 2 species of cuckoo bumblebees, plus those species present in natural sites. Visualization with boxplots and NMDS figures showed results distinguished into two major groups: natural sites and farmed sites. We suggest that cultivated fields can act as a lure to bee species and form an ecological trap, attracting them to foraging sites where they face the greatest risk from pesticides and other anthropomorphic disruption.

High-Resolution Magic Angle Spinning Magnetic Resonance Spectroscopy to Study Changes in Placental Metabolites Over Gestation in Healthy Pregnant Mice

Grace Mercer, Memorial University of Newfoundland – ChemCon 2021

Placental metabolism is known to be an important factor in fetal growth, yet how metabolite profiles change throughout gestation is not well understood. The goal of this project is to determine the effects of gestational age on the metabolites present in placentas using healthy pregnant mice. The mouse reproduces many of the physiological and molecular features of human pregnancy and is a well-accepted model for studying placental development. Healthy adult CD-1 timed pregnant mice were used for this study. Four dams at 15.5 days of gestation and four dams at 17.5 days of gestation (term is 18.5 days) were euthanized and the placentas (n=4/dam) were in flash frozen in liquid nitrogen. These samples were stored at -80 C in order to prevent biochemical degradation. 1H high-resolution magic angle spinning magnetic resonance spectroscopy was performed on a Bruker 600 MHz spectrometer (3.2 mm MAS triple-tuned probe, MAS = 4 kHz). Tentative metabolite assignments were performed according to literature and using two-dimensional spectroscopy. To verify the assignment of each metabolite, Mnova NMRPredict Desktop was used to calculate the 1H chemical shifts. Automatic peak integration was used and the relative concentration was determined by normalizing each metabolite peak(s) to the total signal. The placental metabolic profiles will be presented and compared between gestational ages.

Variability in Egg Hatching Time as Evidence of a Bet-Hedging Strategy in Japanese Medaka (*Oryzias latipes*)

Kelsey Mercer, Saint Mary's University – AFB 2021

Understanding life-history strategies is essential for developing a clear picture of how organisms have evolved and how they may perform under future conditions. Bet-hedging is a life-history strategy that allows populations to persist in unpredictable, variable conditions. It is a risk-reduction strategy that lowers generational fitness while decreasing fitness variability across generations, enabling species survival when conditions are not optimal. As such, it may be a favourable life-history strategy as conditions become increasingly variable due to climate change. Japanese medaka (Oryzias latipes) is a small fish that lives in an extremely variable habitat in the wild. It is commonly used as a model organism for toxicology, oncology, and developmental studies. A robust understanding of their life-history parameters is therefore necessary to determine the effects of different treatments in these studies. These fish demonstrate significant variability in egg hatching times, which does not appear to be influenced by external conditions. The goal of this study was to quantify within-clutch and withinpopulation variability and to determine whether both were consistent across different environments, which would support a bet-hedging theory in medaka egg hatching time. For this study I isolated clutches and determined the hatching dates of the eggs to quantify variability. 24 experimental tanks contained four operational sex ratios (OSR; sexually active males:sexually active females), which allowed for comparison of higher-stress vs lower-stress environments. Maternal size and clutch size were also considered. The observed similarity in variability across all treatments provides support for a bethedging theory.

Characterization of Crab Biochar from Slow and Fast Pyrolysis

Shantelle Mercer, Cape Breton University – ChemCon 2021

This is the first study that compares slow and fast pyrolysis of snow crab waste (Chionoecetes opilio). Impact on structural features, thermal stability, chemical composition and product yield (char and liquid) are discussed. Slow pyrolysis was accomplished at a rate of 6°C/minute with a final temperature of 500 °C for 3.5 hours while fast pyrolysis of the crab waste was done at 500 ºC for five minutes. Slow pyrolysis yields higher volumes of biochar, while fast pyrolysis yields higher volumes of bio-oil. Structural characterisation includes surface area (BET), FT-IR, porosity, zeta potential, solid state NMR, XRD, TEM and SEM. Calcite was the primary element in both chars identified by XRD, proximate analysis and FT-IR and solid state 13C NMR. However, slow char exhibits more residual functional groups from the organic components of the waste.

Fluorescence-Based Investigations of the Host-Guest Inclusion of Anilinonaphthalene Sulfonic Acids (1,8- and 2,6-ANS) by Dimethoxypillar[5]arene in Nonaqueous Solvents

Tara Ann Misener, University of Prince Edward Island – ChemCon 2021

Pillar[n]arenes are a relatively new class of macrocyclic host molecules which have not been extensively studied for their ability to form inclusion complexes. Native pillar[n]arenes are water-insoluble, so binding studies for these hosts have been limited to organic solvents. The properties and host-guest inclusion complexes of dimethoxypillar[5]arene (DMPill[5]) with polarity-sensitive fluorescent guests were investigated in various nonaqueous solvents via fluorescence spectroscopy. Polarity-sensitive probes 8-anilinonapthalene-1-sulfonic acid (1,8-ANS) and 2-anilinonapthalene-6-sulfonic acid (2,6-ANS) were used as guest molecules and were found to form inclusion complexes with DMPill[5] in polar aprotic solvents such as acetonitrile, acetone, THF, and chloroform. Fluorescence titrations were performed with varying host concentrations, which were chosen based on the maximum soluble concentration of the host and guests in each of the solvents. These experiments were conducted to determine the nature and strength of the complexation occurring between DMPill[5] and each of the ANS guest molecules. In the case of 1,8-ANS, 1:1 host:guest inclusion complexes were observed, whereas 2:1 host:guest inclusion complexes were observed with 2,6-ANS. The strength (or lack) of binding in different nonaqueous solvents was found to depend on a range of factors beyond solvent polarity, including guest and solvent shape and size, and most importantly, specific solvent-solute interactions.

Taming the d-shell: An Analysis of the Effect of GGA+U in Density Functional Theory Models of Lithium-Ion Battery Positive Electrode Materials

Laurent Molino, Dalhousie University – AUPAC 2020

Density functional theory (DFT) with the generalised gradient approximation (GGA) is an important method for modeling materials for energy storage. However in certain materials, including lithium-ion battery positive electrode materials, DFT GGA calculations model d-shell electrons as excessively delocalized. A computationally inexpensive solution to this problem is GGA+U. In GGA+U, a potential U is applied to d-shell electrons to improve electron localisation. However, a systematic analysis of the effect of the values of U on the properties of positive electrode materials has yet to be performed, and thus the choice of U values for these materials cannot be fully justified. The goal of this work is to perform such an analysis. GGA+U DFT calculations were performed on layered structures of Nickel, Cobalt, and Manganese using U values from zero to eight eV. Electronic and structural properties of each structure were calculated over the range of U studied, including unit-cell parameters, atom magnetizations, and lithium intercalation potentials. It was found that certain properties, importantly including lithium intercalation potential, change significantly over the range of U studied. This finding supports the conclusion that the value of U must be carefully chosen, and GGA+U may sometimes be inapplicable.

The Effects of Linguistic Background in Young Adults' Executive Functioning

Abbie Morales, Memorial University of Newfoundland, Grenfell – SAPC 2021

Previous studies have suggested that bilinguals generally show an advantage for tasks that require the recruitment of executive functioning and inhibitory control. These bilingual benefits were found to be present in children and old adults but not always in young adults. The present study aimed to examine the bilingual advantage in young adults using similar tasks that were used to find these advantages in other populations. Using a simple Flanker task, the reaction time (RT) results showed a smaller congruency effect for bilinguals than monolinguals which suggested that bilinguals were less negatively affected by incongruent trials. However, this advantage in reaction times was counteracted by a speed-accuracy trade-off, as the congruence effect on error rates was much larger for bilinguals than monolinguals.

X-ray Absorption Spectroscopy Study of Au(130-x)Ag(x) Nanoclusters

David Morris, Dalhousie University – ChemCon 2021

X-ray absorption spectroscopy is a powerful technique which allows for the electronic properties and structural information of a sample to be determined. This talk will cover how this technique can be utilized in the analysis of gold and silver alloy nanoclusters to obtain a better understanding of the relationship between structure and properties. In particular the analysis of the $Au_{130-x}Ag_x(TBBT)_{55}$ (average x = 98, TBBT = S-Ph-p-C(CH3)3) nanocluster will be covered in detail, providing insights into one of the largest bimetallic alloy nanoclusters with a reported structure. Both X-ray absorption near-edge structure (XANES) and extended X-ray absorption fine structure (EXAFS) analysis will be shown, to illustrate how these techniques compliment each other to provide a clear characterization of noble metal nanoclusters. Results from complimentary techniques including X-ray crystallography and femtosecond transient absorption spectroscopy will also be shown, illustrating how X-ray absorption spectroscopy can be used in combination with other techniques to give a more complete understanding of the structure and properties of alloy nanoclusters.

Carbonated Emotions: Consumers' Sensory Perception and Emotional Response to Carbonated and Still Fruit Juices

Rachael Moss, Sophie Barker, Acadia University – SANFC 2021

The global carbonated beverage market is very large, and consumers like the oral irritation (ex. burning, prickling) associated with carbonated beverages. This study's first objective was to identify the effect of carbonation on consumers' liking and sensory perception of fruit juices (blueberry, cherry, apple). The secondary aim was to evaluate consumers' emotional responses to carbonated fruit juices and what they like or dislike carbonated beverages. The first trial asked consumers (n=103) to use check-all-that-apply (CATA) and nine hedonic scales to evaluate six fruit juices (three carbonated and three non-carbonated). In the second trial, consumers (n=107) were asked to evaluate the same juice samples using the CATA variant of EsSense25 Profile® and a purchase intent scale. The consumers were also asked to identify what they like and dislike about carbonated beverages. The first trial identified that flavour was more important than carbonation but did identify that carbonation increased the overall liking of the blueberry and apple juices. In the emotional response trial, the participants did not separate the samples based on carbonation. The penalty analysis identified that when positive emotions were selected, the participants' purchase intent increased. Lastly, the consumers identified they like mouthfeel and flavour-enhancing qualities of carbonated beverages and associated them with special events. However, they disliked if beverages were too carbonated or flat and associated carbonated beverages with negative physical sensations and health perceptions. Future research should investigate how emotions affect purchase intent and evaluate how carbonation affects other beverages.

Predicting the Effects of Forest Harvest on Wood Turtle Habitat Suitability

Damien Mullin, University of New Brunswick, Fredericton – SAEC 2021

Sustainable forest management includes protecting species-at-risk, including the endangered Wood Turtle (Glyptemys insculpta). The Wood Turtle is a challenging species for forest management because females often travel 500+ meters perpendicular to rivers into forested habitats. Forestry occurs in approximately 40% of the Wood Turtles Canadian range making it a widespread threat to the species, however the magnitude of the threat is unknown. Our research objective is to determine the effects of commercial forest harvest on Wood Turtle habitat suitability to better delineate critical habitat. We outfitted 25 female Wood Turtles with VHF transmitters and GPS loggers and are tracking them from 2019-2021 to collect multi-year fine resolution Wood Turtle spatial data. We will then combine this occurrence data with environmental predictor variables collect both on-site and via remote sensing (LiDAR) in a resource selection function to quantitatively inform a habitat suitability model. We will then apply our habitat suitability model to chronosequence forest harvest blocks aged 1, 5, 10, 15, and 25 years, and old-growth forests, to predict the effects of forest harvest on Wood Turtle habitat suitability. To date, we have collected a total of 7,341 active season spatial points from the GPS loggers between June 2019 and September 2020. Preliminary results will be presented as the research is still on-going. This study will provide important data to better delineate critical habitat which has range-wide implications for Wood Turtle conservation.

The Wave Dissipation Potential of *Spartina alterniflora* in the Bay of Fundy

Makadunyiswe Ngulube, Saint Mary's University – SAEC 2021

The purpose of this research is to determine the wave dissipation potential of salt marsh vegetation in a temperate, hypertidal estuary. The study site is Clifton Marsh, Nova Scotia, in the Bay of Fundy. This site was selected in part because it is monospecific, with Spartina alterniflora. The research addresses two key questions: 1. How effective is the Spartina alterniflora at attenuating wave energy? 2. What is the variability in wave height as the vegetation height increases over time? A transect was set up with 4 RBRduet³ T.D|wave16 — temperature & pressure loggers extending from the mudflat to the vegetated section dominated by Spartina alterniflora. Data were collected from mid June to early December 2020. For each two-week dataset, the data was sorted to include only that with a depth greater than 0.1 m, and events were selected to have a significant wave height that is greater than 0.05 m. Vegetation surveys were carried out bi-weekly to measure the various parameters such as the stem height, stem diameter and the width of the middle top parts of the leaves. The outcomes show that vegetation has an effect on the wave energy and significant wave height, and affects the attenuation capacity of salt marshes. This research demonstrates that the presence of vegetation on salt marshes plays an important role in wave dissipation and attenuation. There needs to be a better understanding of vegetated intertidal environments and incoming waves, to achieve sustainable coastal management and planning.

A Path Analysis to Identify Factors Influencing the Provision of Water in Addition to Breast Milk in Mothers of Children Under Six Months of Age in the Regions of Conakry and Kindia, Republic of Guinea

Nèmanan Richard Ninamou, Université de Moncton – SANFC 2021

Introduction: Water provision to children under six months (CU6M) in addition to breast milk (BM) can hamper exclusive breastfeeding (EB), thereby increasing child mortality. Understanding factors and their relationships influencing this practice is needed to tailor EB promotion programs.

Objectives: Using a validated questionnaire based on the extended theory of planned behaviour, this study aims to identify pathways in which factors interact to affect the water provision in addition to BM among 300 mothers of CU6M.

Methods: A quasi-experimental design was used in this study. Three hundred mothers of CU6M were included. Data were analyzed using software SPSS 25 and MPlus 8 (path analyses).

Results: Our finding shows that 75% of mothers intended to provide water and that about 60% reported doing it. Results of the final path show that the subjective norm/SN (β = 0.432, $p <$ 0.001), attitude/ATT (β = 0.349, $p <$ 0.001), and to a lesser extent perceived behavioural control/PBC (β = 0.141, p = 0.007) predict the intention of mothers to provide water to their CU6M. The environment scores predict the ATT (β = 0.210, p = 0.001) and the SN (β = 0.284, $p <$ 0.001). Early initiation of breastfeeding at birth positively predicted the PCB score (β = 0.157, p = 0.003) and predicted an increasing score of SN (β = 0.221, p = 0.003). As for the explained variance of each variable in the model, 14.6% of SN score was explained, 47.1% of ATT score, 18.3% of PCB score, 58.6% of the intent score, and 18.3% of the behaviour.

Discussion: Even though predicting the final behaviour is more complex than simply considering the intention, this research provides directions to tailoring nutrition education programs to be more efficient in reducing the proportion of women providing water to their CU6M.

Investigating the Nitrogen Biogeochemistry of Sewage Organic Materials Using Compound-Specific Isotope Analysi

Rachel Noddle, Dalhousie University – SAEC 2021

Microbial degradation of organic matter plays a critical role in biogeochemical cycling of carbon and nitrogen. Microbes mediate the breakdown of complex particulate organic material (POM) into simpler forms, including degraded particulates and dissolved organic and inorganic molecules. Thus, it is important to characterize the magnitude and pathways of POM degradation. Recently, a geochemical proxy for microbial breakdown of POM, based on the stable nitrogen isotopes of amino acids (δ15NAA) has been proposed. Evidence from field samples indicates that δ15NAA can be used to quantify the extent of microbial re-working and distinguish between different microbial metabolisms. However, the approach has rarely been tested or validated under controlled experimental conditions. We are using samples collected from primary, secondary and tertiary wastewater treatment plants (WWTP) as quasi-controlled chemostats to evaluate changes in the δ15NAA associated with microbial degradation of POM. Water samples (1-2 L) are collected at different stages of treatment, pasteurized, and vacuum filtered through GFF filters. The filtered particulates are then freeze-dried for isotopic analysis. Preliminary data from an advanced primary WWTP show that "bulk" δ15N results range from -0.66 ‰ to +2.26 ‰ (n=6), with δ15N values decreasing through the sewage treatment process. Compound-specific isotope analysis of amino acids will be paired with bulk isotope analysis to elucidate the pathways and extent of microbial alteration of POM during critical steps in the wastewater nitrogen cycle. We anticipate that these results will provide new insights to the interpretation of natural abundance δ15N data in biogeochemistry and paleoceanography contexts.

Monte-Carlo Analysis of Three Kepler Binary Star Systems

Padraic Odesse, Mount Allison University– AUPAC 2021

In a binary star system, two stars orbit a common center of mass. Depending on its orientation, we may observe a periodic decrease in the brightness of a binary system corresponding to an eclipse of the two stars. Eclipsing binaries are of particular interest in stellar astrophysics – their behaviour is governed by well-understood physical laws, so we may constrain the absolute characteristics of each star through analysis of the light curve produced by the system. The aim of this research is to constrain several physical parameters of three binary systems from the Kepler catalogue. To achieve this task, I used the stellar modeling package PHOEBE (Physics Of Eclipsing BinariEs) to generate potential models for a given set of parameters, and used Markov Chain Monte Carlo (MCMC) methods implemented by the emcee python package to estimate expectation values. By sampling different parameter sets for our simulated binary systems, I was able to fit synthetic models to the light curve data of the three eclipsing binaries, and derive a set of well-fitted binary parameters for each system. The issue of degenerate solutions is a well-known problem in binary analysis, so some degree of human intervention is required to identify if our MCMC method has converged on a set of parameter values in the global minimum or a local minimum of the parameter space. Further analysis is required to determine if the parameters for each star are reasonable, and adjustments will be made to the fitting process as necessary to avoid degeneracies.

Physical Stratigraphy and Provenance of Middle Jurassic to Lower Cretaceous Adventdalen Group sandstones, central Spitsbergen, Svalbard

Lindsay Oldham, Memorial University of Newfoundland– AUGC 2020

Laser ablation split stream detrital zircon U-Pb-Hf isotope studies are used to test and constrain paleogeographic reconstructions and depositional models for Adventdalen Group strata in central Spitsbergen, Svalbard. Samples from the Agardfjellet, Rurikfjellet, and Carolinefjellet formations yield 144, 3, and 96 detrital zircon grains, respectively. Preliminary results show Agardfjellet Formation zircon age distributions of 401-459, 907-2054, 2476-2559, and 2616-2906 Ma, supporting the hypothesis of a marked provenance shift from easterly to westerly sources in the Jurassic. Carolinefjellet Formation zircons yield age distributions of 144-165, 233-274, 277-321, 412-459, 1765-2107, 2242-2251, 2529-2769, and 2784-2832 Ma. Renewal of Uralide aged zircons within the Carolinefjellet Formation support paleogeographic models indicating a shift to northeasterly sources during the Early Cretaceous, where sediment supply is restricted from the west by a seaway connecting the Barents Shelf with the Amerasian Basin. Stratigraphic logs, petrographic observations, and Hf isotope geochemistry methods will compliment U-Pb zircon analyses to further constrain sediment composition/texture and potential sources.

Uncovering the Student Athlete Lived Experience in Managing Exercise Associated Gastrointestinal Symptoms: a Mixed Methods Approach

Cayla Olynyk, St. Francis Xavier University – SANFC 2021

Background: Athletes frequently experience exercise-associated gastrointestinal symptoms (ExGIS), yet these experiences have been understudied in student athletes.

Aim: To explore the beliefs and self-management behaviours student athletes use to cope with ExGIS.

Design: Explanatory sequential mixed methods. Methods: A cross-sectional survey (n=93) was followed by in-depth semi-structured interviews (n=4) and thematic analysis using an interpretive phenomenological approach.

Findings: Significant ExGIS was experienced by 31% of athletes in the survey. Athletes shared the understanding of ExGIS as an accepted and ordinary experience. This belief was powerful, as it shaped athletes' self-perceptions, communication patterns and management behaviours. For some, long term unsuccessful practices led to lower self-efficacy and reduced engagement in further self-management behaviours. A collaborative team approach may facilitate open dialogue and should be considered when developing supportive resources.

Conclusion: Future research should consider the role of dietitians and coaches, in supporting athletes through experiences of ExGIS.

Investigating the Mechanistic Roles of Oligofructose-Enriched Inulin in Reducing Body Fat of Overweight and Obese Children

Salma Omardeen, Memorial University of Newfoundland – SANFC 2021

Introduction: Prebiotics, a type of fermentable dietary fiber, are known to mitigate several metabolic diseases, including obesity. They stimulate the growth of beneficial gut microbiota and normalize metabolic reactions. A specific prebiotic known as oligofructose-enriched inulin demonstrated reduced body weight and improved fat metabolism in overweight and obese children.

Objective: In this study, we aimed to investigate novel mechanisms by which oligofructose-enriched inulin improved fat metabolism.

Methodology: Serum and fecal samples of overweight and obese children treated with oligofructose-enriched inulin (prebiotic, n=22) or maltodextrin (placebo, n=20), from a previous clinical trial study, underwent a mechanistic investigation by the use of metabolomics and gut microbiota approaches. For serum metabolomics, we used a Partial Least Square Discriminant Analysis to identify ten significant metabolites that were altered in the presence of oligofructose-enriched inulin.

Results: Metabolites such as D-glucose, L-Lysine, Aspartate, L-Glutamine, and L-Glutamic acid were significantly reduced. Furthermore, pathway analysis revealed modulation of six metabolic pathways due to oligofructose-enriched inulin, such as, Aminoacyl-tRNA biosynthesis; Alanine, Aspartate and Glutamate metabolism; and D-glutamine and D-Glutamate metabolism. For fecal gut microbiota profiling, we used Linear discriminant analysis Size Effect and identified seven significant bacteria belonging to the Oscillospiraceae and Lachnospiraceae families. The relative abundance of these bacteria significantly increased with the consumption of oligofructose-enriched inulin. Lastly, a correlation analysis revealed negative associations between the identified metabolites and gut microbiota.

Conclusion: Our data provide evidence that a gut microbiota-linked modulation of amino acid absorption and metabolism could play a significant role in downregulating the lipid synthesis in overweight and obese children.

Determining Biological Function of miRNA Identified from PDAC Patient Plasma Using an in Vitro Model

Alexie Ouellette, Mount Allison University – AFB 2021

Pancreatic ductal adenocarcinoma (PDAC) is the most common type of pancreatic cancer and has one of the highest mortality rates and poorest prognosis among cancers. Unfortunately, the diagnosis of this cancer is often a lengthy process and requires invasive techniques like tissue biopsies and endoscopies, and the use of various imaging modalities that requires specialized training. The development of liquid biopsy, a non-invasive diagnostic technique that requires a simple blood test, would be beneficial to help diagnose PDAC. My research project aims to identify the biological significance of previously identified up- and downregulated miRNAs found in extracellular vesicles extracted from PDAC patient plasma compared to controls. First, a number of miRNA targets (n = 17) identified by small RNA sequencing in patient samples were validated by droplet digital PCR. Some of these miRNAs (n = 4) were then used to transfect one healthy (H6C7) and one cancerous cell line (PANC 10.05) with a mimic miRNA (increases abundance) and a siRNA (decreases abundance) for each target. The number of live cells was measured 72h post-transfection by flow cytometry. It was found that miR-744-5p mimic decreases the number of live cells (n = 3, $P < 0.05$), while miR-30d siRNA (n = 3, $P < 0.05$) increases the number of live cells. Interestingly, miR-744-5p mimic and miR-30d siRNA had no significant effect on the number of H6C7 cells. These results suggest that miR-744-5p and miR-30d may both be tumour suppressor miRNAs in pancreatic cancer.

Towards Video Based Collective Motion Analysis Through Shape Tracking and Matching

Bivash Pandey, Saint Mary's University – MSCS 2020

The term collective is used to refer to a group of animals such as a flock of birds or a herd of elephants. Aggregate motions of such collectives often give rise to visually pleasing shapes and patterns (e.g. V-shape formation of geese while they migrate from one place to another). While shapes of moving collectives are of great interest in many scientific studies, scant attention has been given to algorithmically extract and render these shapes via polygonal boundaries or graphs. Here, we present a multi-stage, proof of concept framework for 12 tracking geometric shapes and extracting video frames containing a user defined shape of moving collectives, by employing a deep-learning based object detection, well-known alpha shapes and a modified shape context. We demonstrate the usefulness of the proposed framework on a couple of test videos and discuss its potential applications in a wider area.

Using Sportfishing Tournament Data to Determine Factors Influencing Black Bass (Micropterus spp.) Catches and Catch Trends

Victor Papaiz, Dalhousie University – AFB 2021

In 2016, Black Bass species (Micropterus spp.) were the most targeted freshwater fish in the United States. Black Bass sportfishing tournaments are a competition-oriented derivative of this recreational fishery. Previous studies have found that tournaments provide extensive catch data that can be used to assess population trends in the waterbodies in which events occur. This study evaluated the usefulness of sportfishing data in determining the impact of factors such as stocking, predator presence and latitude on average catches and catch trends over time. Publicly available sportfishing data from 896 tournament events occurring over 110 different waterbodies in the United States between 1976 and 2020 were analysed. For each tournament event, the data was used to calculate stock-related variables such as maximum and mean fish size for average catches and catch trends over time. Data was also compiled on 11 biological, physical, and management characteristics hypothesized to influence stockrelated variables. Random forests and correlation matrices were used to determine which factors were most influential for each variable across all waterbodies. These influential factors were then used to create generalized linear models (GLMs) to determine which factors had significant positive or negative effects on each variable. Results indicate that the presence of various target species and latitude significantly affected tournament catches. This work suggests that sportfishing data can be useful in evaluating the impacts of various factors on fish catches and could thus be used to supplement independent scientific and monitoring data to ensure the sustainable management of these important recreational fisheries.

Excitation Energy Transfer in the Chlorosome Light Harvesting Complex

Katherine Parsons, Dalhousie University – ChemCon 2021

The primary steps of photosynthesis are the collection and transportation of the sun's light to a reaction centre. Each reaction centre is surrounded by many light harvesting complexes which are composed of pigments that absorb light as electronic transitions. One such light harvesting complex is known as the chlorosome which can be found in Green Sulfur Bacteria. The chlorosome is unique in comparison to other natural light harvesting complexes due to the lack of a protein scaffold encompassing the pigments and the abundance of pigments present in this complex. The many degrees of freedom that result as a consequence of the numerous pigments in the chlorosome can be numerically challenging for theoretical methods that are applied in the study of excitation energy transfer. An approximate mixed quantum-classical method called the Forward-Backward Trajectory Solution (FBTS) provides a balance between accuracy and computational cost. This allows for the excitation energy transfer to be feasibly simulated and the real-time dynamics of this transport studied. In order to study the transport through the chlorosome light harvesting complex, natural and artificial nanotublar models were constructed to represent the arrangement of the pigments. The excitation energy transfer through these models are studied using the FBTS method and will be discussed in this report.

The Influence of Long-Term Agricultural Management Practices on Red Wiggler Worm (Lumbricus rubellus) Population Abundance and Activity in Cormack, Newfoundland

Natalie Parsons, Memorial University of Newfoundland – SAEC 2021

Earthworms are considered fundamental bioengineers of nearly all earthly ecosystems. The bioturbation carried out by earthworms is known for contributing to improvements in crop yields by enhancing aggregation and alleviating compaction, as well as facilitating nitrogen additions to soils. This in turn, ameliorates root growth capabilities through enhanced aeration, gaseous exchange, water infiltration, and water-holding capacity. Conventional agricultural practices have been designed for maximization of profit and rates of production, without much concern as to the environmental implications of such design. After centuries of unquestioned success, the agricultural sector is now failing due to the severe depletion of soil quality that conventional practices have caused on a global scale. As a result, these environmental concerns are driving food insecurity for the ever-rising human population. Of importance is the universal lack of knowledge of the geographic variability in earthworm populations. Understanding this distribution may provide information that allows for the optimization of management tactics concerning the soil environment. A 10-acre area of farmland in Cormack, Newfoundland, which has been in operation since 1976 was chosen as the location of data collection. The overarching objectives of this study are to compile a history of long-term (>25 years) agricultural activities and management practices performed at this site, to determine how such activities have altered biological and physicochemical properties of the soil environment, to assess how these long-term anthropogenic actions have impacted earthworm distributions and abundance seasonally at this site, and to draw conclusions based on the data collected.

Using Linear Algebra in Quantum Entanglement Theory

Everett Patterson, Mount Allison University – MSCS 2019

As classical computing becomes limited by the laws of quantum mechanics, Quantum Information Theory has arisen as away to utilize these laws to embolden computational abilities. Much of this theory can be expressed using linear algebra, with emphasis on Hermitian matrices and tensor products. Within this field, entanglement plays a prominent role with Entanglement Witnesses (EW) acting as an operator on Quantum States. We examine what properties Entanglement Witnesses must satisfy, and further examine what these properties might tell us about certain families of matrices.

Retrieving Balmer Line Profiles

Mathieu Perron-Cormier, Université de Moncton – AUPAC 2021

The Balmer line profiles are caused by the absorption of photons by electrons on the second energy state of hydrogen atoms. In stellar spectra, these absorption lines can span for more than 100 Å and mix with absorption lines of other chemical elements. To develop a method to subtract the Balmer profiles from the observed spectra, we have developed a toy model to approximate their shape by a Voigt profile using a weighted sum of Gaussian profile and Lorentzian profile. This approximation was further developed by taking into consideration the variability of temperature as a function of optical depth in stellar atmosphere. The Balmer profile can then be recovered by fitting the model using a least squares algorithm. This approach was tested using the high resolution and high SNR spectra of HD22920 and HD166473 obtained with the spectrapolarimeter ESPaDOnS at the Canada-France-Hawaii Telescope.

Geometric Algebra for Relativity

Jeremy Peters, Dalhousie University – MSCS 2019

Geometric algebra is an elegant extension of vector calculus, and provides a unified description in many areas of physics. Geometric algebra is a potentially useful tool to simplify computations in, e.g., numerical relativity. In this talk, I will start by defining the geometric product of two vectors, and use this geometric product to build a geometric algebra on R^n. Preliminary applications of geometric algebra to rigid transformations, the quaternions, and the Pauli algebra in quantum mechanics will be briefly described. Then geometric algebra will be extended to geometric calculus, which is then used to rewrite Maxwell's equations in a single equation. Within this framework, I will show numerical solutions to Maxwell's equations to simulate a 1+1-dimensional oscillating dipole. Finally, I will describe a gauge-theory formulation of GR, which will use objects from geometric algebra. This will be the starting point for future applications in linear and non-linear gravity.

Detecting Changes in Boreal Forest Groundwater Dissolved Organic Matter during the Autumn Transition Period via Study of Base-extracted Particulate Organic Matter

Allison Pond, Memorial University of Newfoundland – ChemCon 2021

Dissolved organic matter (DOM) plays a diverse but critical role in aquatic environments. The flux of DOM entering the aquatic environment represents an important link between terrestrial and aquatic ecosystems. DOM and particulate organic matter are influenced by acidity, trace metal transport, as well as a variety of other conditions. In the following paper, the effects of changing conditions during the evapotranspiration shutdown (or autumn transition period), in the Pynn's Brook Watershed in Newfoundland, on dissolved and particulate matter mobilization is explored. This is done using absorbance, elemental analysis, iron concentrations, and continuous data monitoring. The effects in both upslope and downslope wells are explored. It was found that there is increasing connectivity between upslope and downslope wells near the end of the autumn transition period, and that over this period there are evolving changes in source material, and mobilization of organic matter due to precipitation events. These relationships suggest that understanding the effects of hydrologic shifts in the landscape aid in monitoring and understanding the movement of organic matter in both dissolved and particulate phases. Finally, the effects of climate change on the autumn transition, and therefore organic matter movement, are explored.

Hyperopic Cops and Robber

Amanda Porter, Mount Allison University – MSCS 2020

We explore a variant of the game of Cops and Robber introduced by Bonato et al. where the robber is invisible unless outside the common neighbourhood set of the cops. The hyperopic cop number is the compliment to the cop number and we investigate bounds of this quantity. We define a small common neighbourhood set and relate the minimum cardinally of this graph parameter to Hyperopic Cops and Robber. We analyze various diameter 2 graphs, with a particular focus on the join of two graphs. We investigate a general upper bound for the Cartesian product of graphs.

Elevations of Lobster Fishery Groundlines and the Associated Entanglement Risk to North Atlantic Right Whales in Atlantic Canada

Jaime Rae, Dalhousie University – AFB 2021

The North Atlantic right whale (NARW) is a critically endangered species, and entanglements in fixed fishing gear has been identified as the most significant cause of serious injury and human-caused mortality in the species. Groundlines, which connect gear along the ocean floor, are a primary component of fixed fishing gear that pose an entanglement risk. Previous research has been conducted in the Bay of Fundy to investigate the elevations of lobster fishery groundlines above the seabed. However, little is known about groundline elevations in other active fishing areas in Atlantic Canada that coincide with NARW habitat. This study uses temperature depth-sensor data from Cape Sable Island and Little River to examine groundline elevations in relation to how they may affect the likelihood of a NARW becoming entangled. We also examine factors that may influence groundline elevations, including order of the groundlines on the trawl, depth of the water the trawl is set in, and factors associated with tidal current velocities. Our analyses indicate that in Cape Sable Island and Little River, 26% and 5% of the elevations measured were above 3 m (elevation theorized to pose an entanglement risk; Brillant and Trippel 2010), respectively. These findings suggest that groundlines on the Eastern and Western Scotian shelf reach elevations that are likely to pose a risk to NARWs. This research will provide a better understanding of the risk posed by groundlines to NARWs in Atlantic Canada, and will identify various factors within a fisher's control to reduce groundline elevations.

Re-Analysis of Body Representation in the Somatosensory Cortex: An Investigation of the "Femunculus"

Saisha Rankaduwa, Dalhousie University – SAPC 2021

Despite his collection of data from females, the original 2-D homunculus based on Penfield's work lacks any representation of uniquely female anatomy. Our study created a quantitative 2-D map of female-specific anatomy in the primary somatosensory cortex (S1) based upon analysis of coordinates and images obtained from neuroimaging studies. We conducted a systematic review that included 11 studies. The locations of female-specific anatomy from six of these studies were mapped on a coronal section of the brain. The clitoris, cervix, vagina, posterior vulva, nipple, and breast were all found in the medial wall of S1 in the paracentral lobule, corresponding to the genital region of the homunculus. Various body parts were also found in the secondary somatosensory cortex. Our findings indicate inconsistencies between the locations of anatomical parts between studies. Understanding these limitations allowed us to propose a research plan that comprehensively maps female-specific anatomy in the somatosensory cortices.

Is There Variation in Phenotypic Selection on Floral Traits in Bee-Pollinated Penstemons?

Kaushalya Rathnayake, University of New Brunswick, Fredericton – SAEC 2021

The selective role of pollinators on plant phenotype has been identified as the major force behind the diversification of flowering plants. Therefore, it has been a long tradition to study the relationship between different plant traits and relative reproduction fitness to understand the evolution of optical characteristics and the selection mediated by pollinators upon them. It is known that the state of one trait can also determine the relevance of another. Therefore, studying multiple traits and their functional correlations among each other may help us to answer the question of whether there are specific combinations of traits that are likely to be correlated and fulfill the functions in maintaining the interactions with pollinators to maintain higher reproduction fitness. Here we examined multiple plants and floral traits of two beepollinated species of genus Penstemon; P. strictus and P. mensarum correlated with reproductive success. Our preliminary analysis shows, among 13 individual plant and floral traits, we examined only eight of them explain the variation observed in reproductive fitness. Stem height and number of flowers showed positive selection on reproductive fitness in both plants while the number of aborted flowers showed a negative selection. However, the relative amount of nectar, length of the corolla tube and the width of the constriction on the floral tube had an opposite selection on reproduction fitness between two species. The study will expand further by including floral scent as an attraction trait and analyzing combined effects of olfactory, visual, nutritional and morphological traits in plant reproductive fitness.

Computer Simulation of Two Polymers Confined to a Box-Like Cavity

Desiree Rehel, University of Prince Edward Island – AUPAC 2021

This study, which is motivated by some recent experiments on confined DNA, investigates systems of two identical, linear polymers confined to a box-like cavity with a square cross-section and strong confinement in one dimension. Both Brownian dynamics and Monte Carlo computer simulations, modelling the polymers as bead-spring chains, were used to study the system. Results for quantities such as a time constant characterizing the decay of the mean-square displacement of the centres of mass of the polymers and position probability distributions were analyzed. The behaviour of the system is dependant on box size, and four behavioural regimes were found: (1) The box is large enough that the polymers rarely interact with each other, and the behaviour of the system is unaltered. (2) The box is still large, but the polymers interact more frequently and have a slight preference for the box corners. (3) The box is small enough that the polymers frequently interact but still prefer to be segregated and behave like a Brownian rotor. (4) The box is too small to allow Brownian rotor behaviour, and the polymers start to overlap. In recent experiments on polymers confined to a box with a 10:1 width to height ratio, the polymers the dynamics of a Brownian rotor, consistent with the third behavioural regime observed in the present study.

The Role of Semantic Processing in the Generation Effect

Michaela Ritchie, University of New Brunswick, Saint John – SAPC 2021

Words generated from one's own mind are better remembered than passively read material; this is known as the generation effect. The presence of semantic processing is a necessary condition for the effect to occur. Whether the amount of semantic processing elicited at encoding further enhances the size of the generation effect, beyond the mere elicitation of semantic processes, remains unknown. The purpose of the present study was to elucidate whether a greater amount of semantic processes elicited at encoding is related to greater generation effect sizes. A total of 84 psychology students from the University of New Brunswick participated in this online study, comprising three reading tasks and three generation tasks. The results did not support the hypothesis that greater semantic encoding elicits a greater generation effect; a reverse-generation effect was observed among all stimulus types. The results are discussed in the context of multitasking and writing modality.

Comparison of Pollinator Assemblages on Agricultural Dykelands in the Bay of Fundy

Terrell Roulston, Saint Mary's University – AFB 2021

Pollinators that visit croplands rely on adjacent ecosystems to provide essential resources such as pollen, nectar and nesting habitat. The relative value of different types of vegetation adjacent to farms in coastal environments is poorly understood. This study is a comparison of insect pollinator assemblages found on saltmarshes and dykes, two habitats in coastal dykelands proximal to cropland. It was hypothesized that dykes will support greater abundance and diversity of pollinators compared to saltmarshes due to greater showy floral abundance and diversity, and availability of nesting habitat. Pollinators from sites in the Bay of Fundy dykelands were sampled using pan traps. Floral resources were measured using an abundance index, and flowering species were recorded. Average pollinator abundance was similar between the two habitats with dykes having slightly higher counts. Average pollinator morphospecies richness was similar between the two habitats, with dykes having slightly greater and a larger range in richness. Floral abundance and species richness were significantly higher in dyke habitats. These results seem to contradict other studies that indicate a tight relationship between floral and pollinator abundance. One explanation is an underestimation of floral resources in saltmarshes. This is validated by a field observation of Bombus and Megachilidae bees visiting flowers of Spartina pectinata, a wind-pollinated saltmarsh grass. Further research is needed to understand how pollinators use saltmarshes and dykes (i.e. potentially visiting wind-pollinated species, and availability of nesting habitat). Conservation of wild pollinators in these habitats can potentially have ecological and economic benefits.

Benthic and Planktic Foraminifera Distribution Around Southampton Island, Hudson Bay

Hannah Sharpe, University of New Brunswick – AUGC 2020

Hudson Bay is Canada's largest ocean watershed with one of the country's largest aggregations of Arctic marine mammals. Yet, there are large gaps in scientific knowledge regarding the impact of climate changes on its oceanography and biological productivity. Preserved foraminifera are one of the most common proxies used in paleoceanographic studies, as their distribution and abundance is strongly linked to water mass properties. This study focuses on the analysis of foraminifera preserved in five sediment samples (1cm depth), collected in 2018 and 2019 on the research vessel William Kennedy, which travelled around Southampton Island, situated in the northwest of Hudson Bay. This work includes the analysis of both planktic and benthic species to gain a better understanding of their present-day distribution. Planktic foraminifera provides information regarding sea-surface conditions whereas benthic foraminifera provide sub-surface and deep-water mass property information. This will be done by extracting, identifying and counting the foraminifera using a Stereomicroscope, as well as taking high quality images using a Scanning Electron Microscope. The modern distribution of foraminifera as well other proxies, including geochemical and biomarker tracers, will be linked to environmental parameters such as sea-surface temperature, salinity, sea ice, and nutrient availability. The development of this modern reference database will be instrumental to the subsequent interpretation of tracer variations from long sedimentary cores from around Southampton Island and will allow to better understand the response of this ecosystem to long-term climate fluctuations.

Design of Visible-Light Activated Gold Nanoparticle/Niobium Oxide Perovskites for Application in Water Decontamination

Dreenan Shea, Dalhousie University – ChemCon 2021

Contamination of the global water ways by industrial waste is a pressing environmental issue. Furthermore, global availability of clean drinking water remains a struggle. Many common drugs, such as estradiol and antibiotics, are present in water samples and have been proven to bioaccumulate within human tissues. To date, research in this area has been focused on the use of light as of means of "photodegrading" these aqueous pollutants. Much of this work has focused on the use of UV light sources (high energy UVA and UVB sources) that is non-selective and damaging to other inhabitants of the water ecosystem. The use of light-activated solids with visible light response may improve upon this process. Titanium dioxide (TiO_2) is a popular semiconductor due to its low cost and high photostability. However, alone, TiO_2 also requires harmful UV light to activate the short-lived electron transport capacity of the solid, known as an electron-hole pair. While not ideal, UV activation of TiO_2 is an improvement over direct UV irradiation, as recyclability of the active solid introduces an element of "sustainability" to the photodegradation pathway. However, TiO_2 is plagued with many shortcomings: (i) requiring high energy UV light for light induced activity to be observed and (ii) complete removal of the solid is quite difficult due to its small particle size (~30 nm). The latter is of large concern due to the potential contamination of the watershed with fine particulate matter. Potassium niobum oxide perovskites ($KNbO_3$) is a solid with similar light-active properties to TiO_2, but holds a clear advantage due to its larger particle size (~1 mm) allowing for more facile catalyst recovery. The work to be discussed in this contribution will investigate synthesis of gold nanoparticle/$KNbO_3$ catalysts. Decoration of the $KNbO_3$ surface with Au nanospheres (AuNP; λmax = 530 nm) can extend the lifetime of the electron-hole pair (required for effective degradation of water pollutants) and, most importantly, increase the response of the solid to favour the use of lower energy (visible) light. The ability of the AuNP/$KNbO_3$ composite to facilitate the photodegradation of pharmaceutical pollutants, such as estradiol, tetracycline and erythromycin, will be discussed. Several parameters will be examined in an effort to maximize the efficiency of the photodegradation route, including the influence of environmental pH, as well as a variety of photocatalyst and pollutant concentrations.

Green Synthesis of Symmetrical Cationic Gemini Surfactants (Singer)

Olivia Singer, Saint Mary's University – ChemCon 2021

Gemini surfactants are composed of two hydrocarbon tails with corresponding polar headgroups, linked via a covalent spacer. The synthesis of these surfactants is a very active area of research due to their application as catalysts and other applied areas of study. The modification of green microwave techniques developed in the Singer research group have resulted in the significant improvement of the syntheses of N, N'-bis(dimethylalkyl)-▯,▯-alkanediammonium dibromide (m-s-m type) symmetrical gemini surfactants. The approach reported here describes a remarkably more economical, green, and sustainable methodology of producing symmetrical gemini surfactants that can be utilized for commercial use in various fields. The improved synthetic approach of gemini surfactants and their characterization, including the use of x-ray crystallography, will be discussed.

Determination of the Stereochemistry of Two Polyketide Natural Products

Sarah Smit, University of New Brunswick – ChemCon 2021

Two diastereomers of (Z)-dihydroxy-2-propyl-2,4-octadien-4-olide were recently isolated from the endophytic fungus Alternaria alternata. Despite previous investigations into their relative configurations, the stereochemistry of these natural products remained unknown. Therefore, further investigation was required to completely characterize these two structures. Their relative configurations were assigned using computational chemistry calculations to generate nuclear magnetic resonance (NMR) data that were compared to observed data using coupling constant and CP3 analyses. The absolute configurations of the diastereomers were then determined by Mosher's ester analysis, which gave stereochemical assignments that were in agreement with the relative stereochemistries of the natural products. The structures of the two polyketides isolated from Alternaria alternata have therefore now been fully elucidated and identified as (Z)-6S,7R-dihydroxy-2-propyl-2,4-octadien-4-olide and (Z)-6R,7R-dihydroxy-2-propyl-2,4-octadien-4-olide.

Using Pulsars to Probe the Black Hole Content of 47 Tuc.

Peter Smith, Saint Mary's University – AUPAC 2021

Globular clusters (GCs) have long been thought to be ideal candidates to host Intermediate Mass Black Holes (IMBHs). Recently, the GC 47 Tuc has been subject to claims that it may host a central IMBH, with accelerations derived from pulsar timing being used to bolster these claims. To investigate these claims, we fit multi-mass models with varying amounts of dark mass to the available observational constraints. Our best fitting models accurately reproduce the kinematics of the cluster and incorporate pulsar accelerations into the fitting pipeline. When we compare the results of the fitting which incorporate pulsar accelerations and those that don't, we find a good agreement in the model parameters as well as in the black hole content. For both sets of models, we find a 95% probability that the total mass in black holes is less than 420 M . Given that the proposed mass of the IMBH in 47 Tuc is 2300 M we conclude that with the current pulsar acceleration data there is no need to introduce a central IMBH in 47 Tuc. We finally discuss possible issues with previous results as well as future directions.

Synthesis and Characterization of Novel Iminophosphineplatinum(II) Complexes Containing Aliphatic Groups

Cole Smolensky, Mount Allison University – ChemCon 2021

Since the discovery of its antiproliferative properties, cisplatin and its derivatives have become the leading treatment for cancers of the ovaries, testes, lungs, head and neck.[1] Second and third generation platinum anticancer agents, carboplatin and oxaliplatin, were developed to alleviate some of the drawbacks associated with cisplatin-based drug therapy, such as chemoresistance and toxicity.[2] It is speculated that by modifying the ligands coordinated to platinum, researchers can enhance drug delivery and selectivity of resulting complexes.[1] Iminophosphine ligands present a promising approach to the design of anticancer agents. The bidentate nature of iminophosphines induce stability at the metal center and provide steric bulk; an essential feature for overcoming cisplatin resistance.[3] The variable R-group at the imine appendage can be easily adjusted to afford a variety of compounds with unique chemical properties. The goal of this project was to synthesize and characterize six novel iminophosphineplatinum(II) complexes containing aliphatic moieties. All compounds were characterized using multinuclear NMR and FT-IR spectroscopy and melting point assessment. Elemental analysis was performed on four of the platinum compounds. The cytotoxicity of each platinum complex will be studied in the near future using the MTT method. (1) Johnstone, T. C.; Wilson, J. J.; Lippard, S. J. Inorg. Chem. 2013, 52, 12234−12249. (2) Galluzzi, L.; Senovilla, L.; Vitale, I.; Michels, J.; Martins, I.; Kepp, O.; Castedo, M.; Kroemer, G. Oncogene 2012, 31, 1869−1883. (3) Motswainyana, W. M.; Onani, M. O.; Madiehe, A. M.; Saibu, M.; Thovhogi, N.; Lalancette, R. A. J. Inorg. Biochem. 2013, 129, 112−118.

DNA Cruciforms in Vibrio Species

Lauren Sobot, St. Francis Xavier University – AFB 2021

Alternative DNA structures that do not take the form of the right-handed double helix can contribute to regulating gene expression. DNA cruciforms are alternative DNA structures formed by base pairing between inverted repeats that result in 4-way junctions in DNA. The human pathogen Vibrio parahaemolyticus has been found to form cruciform structures to repress the expression of genes associated with Type III secretion systems, a structure that allows pathogenic bacteria to secrete harmful proteins into other cells. V. parahaemolyticus uses a protein called hemolysin U (HlyU) to bind to DNA cruciforms and reactivate these genes. We hypothesized that other Vibrio species also use DNA cruciforms to turn off gene expression and use HlyU to derepress this activity and induce virulence gene expression. Thus, I determined whether V. vulnificus, V. anguillarum, and V. cholerae contain DNA sequences capable of forming DNA cruciforms in HlyU-binding regions of their genomes. HlyU-binding regions in Vibrio spp. were cloned into pBluescript plasmids. A T7 endonuclease assay was performed on the recombinant plasmids. T7 endonuclease is an enzyme that binds to DNA cruciforms and cleaves the structure on both DNA strands. Cleavage patterns produced by T7 endonuclease suggested that V. vulnificus contained cruciforms in the HlyU-binding regions of their genomes, V. anguillarum did not, and V. cholerae displayed mixed results. The data suggest that gene silencing DNA cruciforms are capable of forming in some Vibrio spp., potentially revealing a virulence regulation mechanism in several pathogenic Vibrio species.

Synthesis of Redox Active Indium Benzenethiolate Complexes

Padmapriya Srinivasan, Mount Allison University – ChemCon 2021

The establishment of the Twelve Principals of Green Chemistry, of which catalysis is a primary tenet, has led the path to reduce waste production in chemical industry. However, industrially relevant catalysts typically incorporate expensive and toxic precious metals due to their favourable redox properties. To reduce cost and environmental impact, the catalytic redox properties of base metals are currently being explored. Indium-based compounds are candidates for such chemical processes due to the low toxicity, relatively low cost and functional group tolerance of the metal centre. Despite these potential advantages, indium is most stable in the +3 oxidation state and does not possess other readily accessible oxidation states. To mediate this, we are exploring the use of redox active "non-innocent" ligands. Our recent studies exploring the synthesis and structural characterization of organometallic indium compounds with the redox active ligand 1,2-benzenedithiol and 2-aminobenzenethiol will be presented.

Dietary Flavonoids Attenuates Carcinogen-Induced DNA Damage in Cultured Human Lung Epithelial Cells

Tharindu Lakshan Suraweera, Dalhousie University – SANFC 2021

Introduction: Cancer is one of the most common causes of mortality worldwide. Lung cancer has shown the highest mortality rates compared to other types of cancers in Canada. Chemotherapy and radiotherapy are currently providing the basis for cancer therapies, although both are associated with significant side effects. Therefore, it is important to identify dietary approaches and food bioactives that can prevent or reduce the initiation of cancer. Flavonoids, a group of polyphenols that are widely present in most fruits and vegetables, have shown anticancer properties through different mechanisms.

Objective: This study focuses on the potential of selected flavonoids in reducing 4-[(acetoxymethyl)nitrosamino]-1-(3-pyridyl)-1-butanone (NNKAc)-induced DNA damage in cultured human bronchial epithelial cells (BEAS-2B).

Method: To identify the effective flavonoids, the dose-dependent response of selected compounds against NNKAc-induced reactive oxygen species (ROS) was conducted using DCFDA assay. The most effective tested compounds that reduced the NNKAc-induced ROS were assessed for cytotoxicity using MTS assay. The DNA protective ability of selected flavonoids was conducted using g-H2AX immunofluorescence and DNA fragmentation assays.

Results: Luteolin, chrysin, quercetin, genistein, cyanidin chloride, and isorhamnetin significantly ($p<0.05$) the carcinogeninduced DNA damage in BEAS-2B cells.

Conclusion: The results demonstrate that flavonoids such as quercetin, luteolin, cyanidin, and genistein have the ability to reduce chemical carcinogen-induced DNA damage.

Effects of Hatchery Environments on Atlantic Salmon (Salmo Salar): Comparing Egg Diameter, Fecundity, and Egg Survival Rates to the Eyed Stage Between Smolt-Adult-Supplementation Cohorts and Hatchery-Winter Classes

Reid Sutherland, University of New Brunswick, Fredericton – AFB 2021

The smolt-adult-supplementation strategy (SAS) has been adapted by the Collaboration for Atlantic Salmon Tomorrow (CAST) initiative in attempt to propagate the wild population of Atlantic salmon (Salmo salar) in the Miramichi River, NB. Traditional juvenile stocking methods breed wild fish in captivity and release juvenile fish to their natal rivers, however, the SAS strategy relies on the capture of wild smolts from their natal river, the captive-rearing of these fish, and their subsequent release at sexual maturity to spawn. Though this strategy is effective in protecting smolt migrating to sea from unresolved, increasing mortality rates in marine environments, little is currently known about the effects of keeping SAS fish in-hatchery for different durations prior to release. In this study, twohatchery-winter (2HW) SAS fish were compared to three-hatchery-winter (3HW) individuals. The increased mean fork length, egg size, and absolute and relative fecundities of 3HW fish do not indicate any benefit to keeping 2HW SAS fish in-hatchery for an additional winter and SAS fish produced by MSCC appear to be morphologically inconsistent from cohort to cohort, despite their common hatchery winter ages. Additionally, the survival rate of eggs to two days post-shock the eyed stage did not differ between hatchery age classes.

A Wearable System for Gait Phase Prediction and Interactive Movement Feedback

Will Taylor-Melanson, University of Prince Edward Island – MSCS 2019

We present an interactive wearable system which operates as a function of the wearer. This system tracks continuous phases of a movement in real-time using a recurrent neural network. As part of this work, we present a wearable prototype that implements our design. The prototype is capable of tracking one's gait and producing interactive vibrational haptic feedback synchronized with one's walking strides. We deploy the system in a pilot study of seven walking subjects who interacted with the system. As the subjects walked on a treadmill, they received haptic vibrational stimulation synchronized with their walking strides. We outline a number of additional feedback modalities that are possible with our architecture. Further, we outline our data labeling system to produce data sets for supervised learning and present the recurrent neural network architecture that drives our system. Continuous phase tracking contrasts with other comparable systems that identify discretized phases or temporal landmarks within a movement. When compared to other recent attempts to continuously track the phase of walking movements, our system produces superior performance results with smaller training data sets. For our pilot study, our system achieves real-time operation without having seen data from any of our seven subjects.

The Complementary and Alternative Therapy Use, Dietary Behaviours, and Food Choices of People Living with Arthritis

Rianna Teeuwissen, University of Prince Edward Island – SANFC 2021

Introduction: Arthritis patients may use dietary complementary and alternative medicine (CAM) therapies in addition to prescribed medications, which can lead to adverse consequences. Often, the healthcare provider is unaware of such patient behaviors.

Hypothesis: Patients combine dietary CAM therapies with prescribed medications. OBJECTIVE: To explore the use and reasons for combining dietary CAM therapies among arthritis patients.

Methods: Twenty-three individuals living with arthritis were recruited for one-on-one guided interviews.

Results: Participants (f=18; m=5) ranged in age 18 to 80 (39%>65). The predominant subtype was osteoarthritis. Only 1 participant refrained from CAM therapies, 7 participants used a special diet, 14 participants used natural health products, 8 participants avoided certain foods, 7 used vitamins and minerals, 5 drank teas, and 4 ate selective foods. Reasons for CAM therapy included perceived low risk and the feeling that they needed adjunct support for their prescriptions. Information about CAM came from informal sources, including the internet, family, and friends. Arthritis symptom management was a predominant reason for pursuing CAM therapies.

Discussion: Typically, patients felt the need to search for relief beyond that which was provided through traditional support. Patients felt that they had to be self-advocates to manage their discomfort. The latter being a coping strategy for dealing with the healthcare system. Despite research evidence, participants perceived CAM as safe and helpful.

Conclusion: A gap in the healthcare system for arthritis support warrants further recognition, patients self-treat when their condition is not receiving adequate attention. Further education for patients and clinicians is recommended.

How Does Time of Collection During the Fishery Impact the Morphometrics of the Sea Cucumber (Cucumaria frondosa)?

Kate Tobin, Memorial University of Newfoundland– AFB 2021

Sea cucumbers (Echinodermata: Holothuroidea) have been consumed as a luxury food and in traditional medicine for thousands of years in Asia. The increasing demand for sea cucumber resulted in the expansion of commercial trade into North America, where marketed products include the body wall (skin), muscle bands (meat), and aquapharyngeal bulb (flower). The present study aimed to compare the quality of sea cucumber (Cucumaria frondosa) harvested early (July) and late (September) during the Newfoundland fishing season, using morphological metrics. The weight and thickness of body wall with muscle (BWM), and organ indices (wet weight ratios with BMW as denominator) were compared. Individuals harvested in September had heavier and thicker BWM, and higher indices for most organs (digestive tract, gonad, and respiratory tree) than individuals harvested in July. This trend is consistent with the seasonal spawning activity of C. frondosa around the spring phytoplankton bloom and subsequent feeding and growth over the summer months. Surprisingly, the aquapharyngeal bulb showed a different trend compared to the other organ indices, with higher indexed values early than late in the season. This suggests that the aquapharyngeal bulb (a cartilaginous organ) remains fairly inert during the feeding period, whereas the BWM is being replenished, possibly identifying it as a good candidate for an index denominator. Overall, these results suggest that harvesting C. frondosa later in the fishing season may lead to better quality products by taking advantage of natural seasonal variations in growth and body composition. Biochemical analyses are underway to confirm this assumption.

The Art of Self-Deception: Individual Differences in Death-Thought Accessibility Following Standard Manipulations of Mortality Salience and Delay

Robb Tupper, Acadia University – SAPC 2021

According to Terror-Management Theory (TMT), all people are afraid of death, whether they realize it or not. Despite this, people report varying degrees of fear of death. Are people who say they are not afraid of death in denial? The current study sought to test this hypothesis using TMT methodology. Accordingly, I assessed the extent to which people dismiss thoughts of death from focal attention following a death reminder (i.e., mortality salience; MS) using an implicit measure of death-thought accessibility (DTA). Participants (N=758) completed a pre-screening questionnaire assessing self-reported fear of death (FOD) and were randomly assigned to a 2 (MS v. control) × 2 (delay v. no delay) between-subjects factorial design. Results showed only an MS × Delay interaction such that DTA was heightened immediately after MS, but not after a delay. FOD did not moderate the results.

Petrology, Age, and Tectonic Setting of the Gunshot Brook Pluton, Eastern Cobequid Highlands, Nova Scotia

Miguel Vaccaro, Acadia University – AUGC 2019

The Cobequid Highlands of northwestern mainland Nova Scotia have a complex tectonic history and are considered to form part of the southern margin of Avalonia. The area is generally interpreted to have developed as a series of volcanic arcs and back-arc basins on the periphery of Gondwana. The highlands are divided into two distinct fault-bound crustal blocks - the Jeffers block to the north and west, and the Bass River block to the south and east. The Gunshot Brook pluton is located on both sides of the Millsville fault, a splay off the Rockland Brook fault that separates the Jeffers and Bass River blocks, and it is not clear to which block the pluton belongs. Previously published work combined with mapping for the present study show that the pluton intruded the ca. 750-735 Ma Mount Ephrairn plutonic suite on its southern margin and the Dalhousie Mountain Formation of uncertain age on the north and northeast. An unpublished U-Pb zircon age of ca. 605 was previously reported for the Gunshot Brook pluton, but an older U-Pb zircon age of ca. 638 Ma has also been obtained, and if correct, indicates that the Dalhousie Mountain Formation is older than other volcanic units in the Jeffers block. Based on petrographic study of about 100 samples collected in the present and related earlier studies, the Gunshot Brook pluton varies gradationally from tonalite to granodiorite and monzogranite, with minor co-mingled dioritic rocks, all cut by mafic and felsic dykes. Previously published and new whole-rock chemical data for about 50 samples display trends consistent with a comagmatic relationship among the tonalitic to monzogranitic rocks, with a compositional gap between those rocks and the dioritic rocks. The suite is calc-alkalic and likely formed in a continental margin subduction zone. Preliminary results indicate that no significant differences in rock types or chemical characteristics occur across the Millsville fault. Additional U-Pb dating is in progress to attempt to resolve the ambiguity about the age of the Gunshot Brook pluton.

Conformational Study of Unsaturated Organic Compounds: Computational Analysis using the Bent Bond/Antiperiplanar Hypothesis

Natasha Vatcher, University of New Brunswick – ChemCon 2021

Computational chemistry is a field that allows us to explore the ever-expanding depths of chemistry in ways that we have never been able to before. In this particular study, computational chemistry methods were used to study the bent bond/antiperiplanar hypothesis (BBAH) through the analysis of unsaturated systems. The study and interpretation of unsaturated acyclic systems, cyclohexenes and methylenecyclohexanes can provide further insight in supporting the bent bond/antiperiplanar hypothesis (BBAH) orbital model and allow for a better understanding of conformational preferences. For this study, quantum single point calculations were carried out on the relaxed potential scan output for a series of unsaturated molecules in order to determine their relative energies at varying dihedral angles. The data obtained from this study was analyzed and compared to experimental and computational literature data reported in previous studies. The results were then interpreted using the BBAH model.

Characterizing the Impact of Soaking and Germination on the Aroma Profile and the Chemical Composition of Yellow-Eyed Bean Flour

Lauren Viana, St. Francis Xavier University – SANFC 2020

Pulses, including yellow-eyed (YE) dry beans, are being used more frequently in food applications due to their nutrient density and sustainable production. Bean flours may be used as alternative gluten-free flours; however, their widespread application is limited due to the presence of undesirable off-flavours and aroma active compounds (AACs). Soaking and germination have been previously used to alter the type and abundance of AACs present in pulses, but the effectiveness of these methods to modify AACs present in YE beans is not known. The objective of the present study is to characterize the effects of germination and soaking on the aroma profile and chemical composition of YE bean flours. Gas-chromatograph/mass spectrometry was used to identify and quantify the relative abundance of AACs in the various flour samples. Hexanal was the most abundant AAC in the germinated samples (25.2%) whereas in flour from soaked and ungerminated, raw beans, the relative abundance of hexanal was 4.6%. The impact of these treatments on the chemical composition of the flour samples were also evaluated by measuring the protein, fat, and starch contents. There were no differences between the protein and fat contents measured, however, the germinated YE flour had a significant decrease ($p < 0.05$) in starch content compared to the raw and soaked YE flours. Overall, it was shown that soaking and germination altered the chemical composition of YE flour. However, sensory evaluation studies are needed to determine whether the differences observed in the relative abundance of AACs are desirable or undesirable.

The Effects of Dehulling and Germination on the Functional Properties and Off-Flavour Compounds in Yellow-Eyed Bean Flours

Lauren Viana, St. Francis Xavier University – SANFC 2021

Introduction: Pulses are economically and sustainably important crops that are recognized for their high nutritional content. Yellow-Eyed (YE) beans are locally-grown pulses and may be used as gluten-free flours in different food products. However, the presence of off-flavour compounds limits their widespread application. Germination and dehulling are cost-efficient pretreatments used to modify off-flavours in pulses, however their efficacy in YE beans is not wellknown.

Objective: To characterize the effects of dehulling and germination pre-treatments on the functionality and off-flavours of YE bean flours.

Methods: Gas-chromatograph/mass spectrometry was used to analyze beany volatile compounds in five flours; raw-control (RBF), whole/soaked-control (WSF) and whole/germinated (WGF) dehulled/soaked (DSF), and dehulled/germinated (DGF) YE flour. Results of proximate analysis, total starch content, water/oil holding capacities, and lipoxygenase and lipase activities were also compared between pre-treated flours and control flours.

Results: Compared to RBF, all pre-treatments significantly increased total starch content and WHC. Lipase activity increased in all samples except DGF. The relative abundance of beany volatile compounds also decreased in DSF, but was maintained in WGF and DGF.

Discussion: Increased starch and water holding capacities and decreased lipoxygenase activity were attributed to nutrient leaching during soaking. Conversely, the variable effects of pre-treatments on volatile compound abundance were attributed to differing lipase activities and lipid peroxidation.

Conclusions: Dehulling and germination pre-treatments maintained or improved the functionality of YE bean flours and dehulling decreased the abundance of most measured beany off-flavours. Further sensory studies are needed to determine how these pre-treatments impact the acceptance of food applications.

Characterization of Apatite-Hosted Silicate Melt Inclusions in Magmatic Rocks Associated with the Cantung (W-Cu-Au) Skarn Deposit, Northwest Territories

Andrew Wagner, Saint Mary's University – AUGC 2019

The Cantung (W-Cu-Au) skarn deposit, Northwest Territories, Canada, is one of the most significant high-grade W deposits in the world. The deposit occurs at the contact between Cambrian limestone (Sekwi Formation) of the eastern Selwyn Basin and the Cretaceous Mine Stock Pluton of the Tungsten-Tombstone magmatic belt in the northern Canadian Cordillera. The Mine Stock pluton consists of a sub-alkaline biotite monzogranite with coeval aplite, pegmatite, and lamprophyre dykes. Reduced W skarn deposits, such as Cantung, form through the interaction of W-rich, low salinity fluids with limestone country rock, producing a zoned array of calc-silicate skarn endowed in scheelite (calcium-tungstate). Mineralizing fluids for Cantung were either derived from the Mine Stock Pluton, or a related magmatic-hydrothermal system at depth, which is now preserved as the late-stage dykes and quartz veins. This study characterizes the apatite-hosted melt inclusions within the Mine Stock, in order to test whether the Mine Stock Pluton is the source of tungsten in the Cantung deposit. The melt inclusions occur predominately as crystallized (i.e., multi-phase), colorless and transparent inclusions, exhibiting a negative crystal shape, suggesting primary origin. Trace element concentrations of un-homogenized melt inclusions have been determined via laser ablation induced coupled plasma mass spectrometry (LA-ICP-MS). The inclusions have variable compositions, some of which are highly fractionated (Ti/Zr = 1 to 23; Zr/Hf = 1 to 29; n = 60), similar to previously reported whole-rock data for the late stage aplite dykes (Ti/Zr = 3 to 13; Zr/Hf = 8 to 17). The inclusions contain high and variable abundances of incompatible elements such as W (2 to 40 ppm), Sn (27 to 121 ppm), B (100 to 10271 ppm), Cs (10 to 1448 ppm), and Bi (11 to 399 ppm). Continued work includes homogenization experiments and electron probe microanalysis to quantify major elements abundances and volatiles in the melt. Whole-rock major and trace element abundances of the Mine Stock will also be determined via X-ray fluorescence and ICP-MS. This data will be used to model melt evolution and W-enrichment and determine the crystallinity of the melt at the point of fluid saturation.

Repellent and Acaricidal Effects of Basil Essential Oil and Rock Dust on Ticks

Haozhe Vincent Wang, Acadia University – ChemCon 2021

Ticks, such as blacklegged ticks (Ixodes scapularis) and American dog tick (Dermacentor variabilis) are vectors of several pathogens that negatively impact animal and human health. In recent years due to global warming, the threat of disease transmission has risen significantly, resulting in an increased demand for environmentally safe, tick repellent and acaricidal products. Natural products, such as essential oils and inert rock dust, are prospective alternatives to manage these pests. Basil (Ocimum basilicum, L.) has been reported to have promising pest repellent activity. We extracted and characterized essential oils from different basil varieties. Over 50 compounds were identified. We tested basil oils for long-term repellent activity towards nymphs of blacklegged ticks using horizontal bioassays at different concentrations. In addition, we combined basil essential oils with an inert material (i.e., granite rock dust) with known insecticidal properties to assess acaricidal activities against adult ticks. Among the tested basil varieties, Jolina essential oils (15% v/v) repelled 96% of tested ticks up to 2 hours post-treatment. In acaricidal tests, the combination of essential oils from Aroma 2 var. at 10% w/w with rock dust resulted in 100% tick mortality after only 24 hrs post-exposure. The use of essential oils alone, and in combination of rock dust, represents an innovative and environmentally-friendly approach to manage ticks and reduce the spread of vector-borne diseases.

Herbal Essential Oils to Treat Sore Throat: Antibacterial Activity of Carvacrol Against Streptococcus Pyogenes

Niluni Wijesundara, Dalhousie University – SANFC 2021

Background: Medicinal herbs and spices have biologically active compounds with numerous therapeutic and pharmacological applications. It is important to identify specific phytochemicals as natural antimicrobial agents to overcome treatment challenges of conventional antibiotics.

Objective: The present study aimed to assess the antibacterial activity of carvacrol, naturally present in essential oils of herbs such as oregano and thyme, against Streptococcus pyogenes. Carvacrol was evaluated for the growth inhibition, bactericidal effect and killing time against four strains of S. pyogenes. To evaluate leakage, carvacrol-treated bacteria supernatants were visualized using agarose gel electrophoresis and assessed for lactose dehydrogenase (LDH) activity. Morphological changes were visualized by transmission microscopy (TEM). Flow cytometry (FCM) was conducted to determine changes in permeability and membrane potential. A protoplast-model was used to confirm the membrane target of carvacrol.

Results & discussion: All the tested strains were susceptible to carvacrol, where minimum inhibitory concentration (MIC) and minimum bacterial concentration (MBC) were 125 and 250 µg/mL, respectively. Time-to-kill was only 5 min for carvacrol at MBC when compared to 24 hr for Penicillin at MBC. Dose-dependent leakage of nucleic acids and cytoplasmic LDH and ultrastructural cell membrane damages were observed in carvacrol-treated bacterial suspensions. Protoplast experiments confirmed the membrane damage mechanism of carvacrol.

Conclusion: Carvacrol exhibited growth inhibition and bactericidal properties against S. pyogenes through disruption of the bacterial membrane and increased permeability. Therefore, carvacrol has the potential to develop safe and efficacious natural health products for S. pyogenes infections.

Domineering in Misère Play

Michael Willette, Aaron Dwyer, Memorial University of Newfoundland, Grenfell – MSCS 2019

In combinatorial game theory, misère play is a set of rules in which the first player who cannot make a move is the winner. Games under this rule set are complicated to analyse, as many of the algebraic properties of normal play, in which the first player who cannot move loses, are not present. This talk will take a look at the combinatorial game Domineering under misère play, and explore both the difficulties encountered and methods used in finding results under certain restrictions.

Quantifying the Causes of Increased Human-Black Bear Interactions Across Nova Scotia

Andrew Willms, Dalhousie University– SAEC 2021

Nova Scotian residents are seeing an increase in the presence of black bears around their properties and homes. This year, the Nova Scotia Department of Lands and Forestry received a record amount of over 1000 human-black bear conflict reports from residents across the province, nearly doubling the total received in 2017. These interactions are categorized by their potential to harm a resident's property, livestock, crops, personal safety, or pets. While many studies have examined bear ecology, few have quantified the spatial and temporal patterns leading to human-black bear conflict. This study examines the causes for rising human-black bear conflicts within three study areas across Nova Scotia, Canada – Amherst, Waverley and New Glasgow. Through a spatial analysis in ArcMap Pro, Landsat imagery from 2016 and 2019 was examined to uncover whether the presence of crops, berry fields, forest-urban fringe, and urban development play a role in the increasing frequency of human-black bear interactions. Data from the 2016 Census was mapped to highlight whether factors like population density, income and housing type were influential, with ANOVA testing and logistical regression used as statistical analyses for each variable. Preliminary results show that the drivers of increased conflict are unique to each area, with the presence of crops, berries and urban development being most influential. The final results will help inform local communications strategies aimed at curbing human-black bear conflicts by providing the necessary information to contextualize these strategies to each community, helping to reduce the number of human-black bear interactions across Nova Scotia.

Alternative Theories of Gravity: Examining f(T) Gravity Cosmological Models

Daniel Winters, St. Francis Xavier University– AUPAC 2021

Finding new, alternative theories of gravity is of strong interest of researchers in the field of Cosmology. Even though Einstein's theory of General Relativity (GR) works very well in describing the dynamics of small scale and solarsystem scaled systems, it continues to have difficulties modeling the dynamics in the cosmological and quantum scales. In Cosmology, GR can not competently explain the well-observed continuously accelerating expansion of the universe without the introduction of a "fix", notably named the cosmological constant. This unobservable fix accounts for dark energy, which comprises 68 percent of the total mass-energy in the current universe. Accounting for the majority of the universe's energy and matter budget by adding an unobservable fix in GR models is unsatisfactory. Perhaps an alternative theory of gravity, such as Teleparallel Gravity, may better explain the effects of dark energy and matter, without the need of introducing the cosmological constant. In the context of an extension of Teleparallel Gravity, f(T) Gravity, we undertake cosmological models and search for their solutions. Within a suitable choice of non-diagonal tetrad frames, the decoupled equations of motion are obtained for the most general case of Bianchi V symmetry models, from which we obtain the correspondent solutions. A unique result arises, and it is shown that for the most general Bianchi V model that the time derivative of the torsion scalar set equal to zero is a solution.

Convective Overshoot in Ceheid Variables

Zoë Wright, Mount Allison University – AUPAC 2020

Cepheid variable stars are known to pulse at regular periodic intervals. These pulsations can be mathematically described in terms of a pulsation constant, Q. The relationship between this constant and the convective overshoot within a star may dictate the size of the star's helium core; and therefore its future. To test this theory, we are evolving a theoretical grid of Cepheids using MESA software, and analyzing the affects of different overshoot values using GYRE.

Synergistic Multimodal Cancer Therapy using Glucose Oxidase@CuS Nanocomposites

Brian Youden, University of Waterloo – ChemCon 2021

Effective monomodal treatments of cancer are challenging owing to their rapid growth, cellular heterogeneity, rapid metastasis, and the strong possibility of developing resistance to therapeutics. However, these challenges can be addressed in part through multimodal synergistic therapies that employ a combination of treatments, particularly those which utilize aspects of the tumor's adaptive biochemistry. In this study, we have demonstrated that facilely-synthesized Glucose-oxidase-coated Copper Sulfide (CuS) nanoparticles can serve as effective multifunctional agents towards an in-vivo melanoma mouse model through a combination of glucose starvation, photothermal therapy, and synergistic (photo-)chemodynamic therapy via a chloride-enhanced Fenton-like reaction on the NP surface. The surface adsorbed enzymes were shown to be capable of converting endogenous glucose into gluconic acid and H_2O_2, the former of which could activate the CuS nanoparticles to further transform H_2O_2 into ROS ($1O_2$ or •OH) or molecular oxygen. This chloride-accelerated catalysis and the resulting anti-tumor efficacy could be further enhanced by concurrent photothermal/photodynamic therapy owing to the strong near-infrared plasmon resonance of CuS. The combined treatment strategy ultimately resulted in near-complete remission of the tumor bearing mice without any significantly observed systemic toxicity during the treatment period as determined by blood biomarkers and histopathological examination of the major organs. Overall, our results suggest that Glucose-oxidase-coated CuS nanoparticles could be a cheap and effective clinical treatment option.

Identification of Superior Apple Genotypes for the Management of Type 2 Diabetes

Cindy Yu, Dalhousie University, Agricultural Campus – SANFC 2020

Dietary antioxidants and polyphenols have shown to reduce type 2 diabetes (T2D) risks and manage glucose homeostasis of diabetic patients. Apples are a common, easily accessible fruit that is polyphenol-rich. The long-term goal of this research initiative is to develop a unique blood-glucose-managing apple cultivar for health-conscious consumers. In the present study, total antioxidant capacities (TAC), total polyphenolic contents (TPC), and inhibitory activity of carbohydrate-hydrolyzing enzymes in vitro of 500 apple genotypes were assessed. Apples were collected at the commercial maturity stage from the Apple Biodiversity Collection in the 2016 harvest season (Kentville Research and Development Centre, Agriculture and Agri-Food Canada, Kentville, NS). Frozen, ground whole fruit samples were used for extracting polyphenols using sonication-assisted 80% methanol. The TAC (ferric reducing antioxidant power assay) and TPC (Folin-Ciocalteu assay) values had a strong, positive correlation (r2=0.905; p=0.000) suggesting that polyphenols are the major contributor to the antioxidant capacity of apples. Positive correlations were also observed between TPC and Œ±-amylase inhibition, and Œ±-glucosidase inhibition. The superior genotypes identified Marechal (France), Daux Belan (France), and KAZ 95-18-05 (Kazakhstan) will be further investigated as unique dietary sources for managing T2D using an experimental animal model of diet-induced insulin resistance.

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