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The GSA's 20th Annual Meeting of the Minds Inter-Disciplinary Conference would not have been possible without the support of our sponsors, conference committee, volunteers, reviewers and well-wishers. Thank you!

Conference Committee:

Ridwan Tajudeen
Bianca Watson
Patrick Akwaboah
Niayesh Allahdad
Chiedozie Alumona
Natalie Krizan
Jade Oldfield
Alireza Taheritorbati
Clara Cunha

Special Thanks

Dr. Erasmus Okine
Alumni Relations
Office of Research & Innovation Services

Reviewers

Chiedozie Alumona
Patrick Akwaboah
Ridwan Tajudeen

Who We Are

Welcome to the 20th Anniversary of the Graduate Students' Association Meeting of the Minds Conference!

The Graduate Students' Association is pleased to welcome you to the 20th anniversary of the University of Lethbridge's Meeting of the Minds Conference. For two decades, this conference has provided a space for graduate students across disciplines to share their research, exchange ideas, and engage in meaningful scholarly dialogue.

Meeting of the Minds reflects the strength and diversity of graduate research at the University of Lethbridge. Through poster presentations and short talks, this conference highlights the innovation, curiosity, and dedication of our graduate student community.

As we mark this milestone year, we celebrate not only the work being presented today, but also the collaborative spirit that has sustained this conference over the past twenty years. We thank our presenters, organizers, volunteers, and attendees for their contributions and ongoing support.

We hope this conference inspires connection, conversation, and continued exploration.

Graduate Students' Association

2025 – 2026 Council Members

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Graduate Students' Association

Executive Members

JADE OLDFIELD

PRESIDENT

Pursuing a PhD in Neuroscience, Jade Oldfield's goal as the Graduate Students' Association's President has been to focus on initiatives geared towards student awards and funding, food sustainability and improving the University of Lethbridge graduate Student experience.

RIDWAN TAJUDEEN

VICE PRESIDENT OF ACADEMIC & STUDENT LIFE

With a strong background in leadership, advocacy, and student engagement, the Graduate Students' Association's VP Academic, Ridwan Tajudeen, has consistently worked to support diverse student needs both on and off campus. Ridwan has fostered an inclusive, supportive, and empowering environment for all students to thrive academically, socially, and professionally. He is a dedicated and driven graduate student passionate about student wellbeing.

RAZEEN MUJARRAB

VICE PRESIDENT OF FINANCE & SERVICES

An MSc student in Management (Marketing), the Graduate Students' Association's VP Finance, Razeen Mujarrab, has ensured that student needs inform and shape the GSA's financial decisions. His commitment to proper money management and making the GSA budget benefit the graduate student body has made him an integral part of the GSA Executive team.

University of Lethbridge Provost & Vice-President Academic:

Dr. Michelle Helstein

On behalf of the Provost's Office at the University of Lethbridge, I am pleased to welcome you to the Graduate Students' Association's Meeting of the Minds conference. This annual event celebrates the breadth and excellence of graduate research, creative activity, and scholarly inquiry taking place at our university. Meeting of the Minds provides an important forum for graduate students to share original research, creative works, and community-engaged scholarship, and to engage in thoughtful dialogue across disciplines.

Graduate students make vital contributions to the intellectual life of the University of Lethbridge. Through research, artistic practice, and applied and community-focused work, they help address complex questions, advance knowledge, and contribute meaningfully to social, cultural, and professional contexts. This conference highlights not only the quality of that work, but also its relevance and impact.

I commend the Graduate Students' Association for its leadership in organizing the conference and for fostering a supportive and inclusive space for scholarly exchange. I also thank the faculty, staff, adjudicators, and volunteers whose time and commitment make this event possible.

I wish all participants a rewarding conference experience, and I look forward to the ideas, conversations, and connections that will emerge from this year's Meeting of the Minds.

Michelle Helstein, PhD

Provost and Vice-President Academic
University of Lethbridge

University of Lethbridge Vice-President Research:

Dr. Dena McMartin

Welcome and congratulations to all graduate students, post-doctoral researchers, and undergraduate students who are participating in this year's Meeting of the Minds.

Celebrating a 20th anniversary of your flagship event that highlights and celebrates the exceptional research, scholarship, and creative activities of student researchers from across the disciplines and spaces on our campus is an important milestone. Such longevity and commitment speaks volumes about the energy, curiosity, and commitment that graduate students bring to our campus year after year.

When faculty, students, and partners connect in a Meeting of the Minds, we find commonalities, critical perspectives, and new ideas. A conference like this thrives on the power of connection: ideas meeting ideas, disciplines meeting disciplines, and people meeting people. Every conversation you have over the next few days, whether during a presentation, the poster session and arts exhibition, over snacks or at the gala awards dinner, or even an unplanned and informal hallway chat, has the potential to spark something new. That spark of an idea is often where research takes its most exciting turns toward impact.

For twenty years, Meeting of the Minds has been created, organized, and sustained by students who believe in the value of gathering together to share their work and hone their professional communication skills. That longevity is a real achievement. It shows what can happen when a community decides that collaboration, creativity, and curiosity are worth investing in.

As you take part in this year's conference events, I encourage you to enjoy the moments of discovery. Offer an opinion or idea; accept feedback and accolades. Be open to unexpected connections and the fresh perspectives that emerge when minds meet with genuine interest and respect.

Thank you to the organizing committee for your hard work in shaping this anniversary celebration. And thank you to all the presenters who are contributing your ideas and impacts through research and creative activities. I hope the conference leaves you feeling inspired and even more connected to the wider research and creative community around you.

Dr. Dena McMartin

Vice President of Research
University of Lethbridge

Dean of the School of Graduate Studies:
Dr. Jacqueline Rice

I'm delighted to celebrate the **20th anniversary of Meeting of the Minds**. I've watched this conference evolve—from encouraging my own graduate students to participate, to its online pivot in 2020, and now to a vibrant 2026 event that connects our campus and wider community.

The University of Lethbridge may be small, but our impact in **research and graduate** world-**education** is anything but. We proudly support class scholarship across disciplines—from Art to Zoology—and place real value on the *whole graduate student*: their ideas, perspectives, and experiences. That focus truly shows the quality of our research and the strength of our graduate community. Our graduate students are motivated, talented, and driven, and I'm honored that they chose the University of Lethbridge for their graduate journey.

Meeting of the Minds is a shining example of what graduate students have contributed to the University. Conceived, organized, and sustained by the **Graduate Students' Association** for two decades, it speaks volumes about the vision and leadership of our students. I'm proud to be a part of this event and I look forward to the next 20 years of Meeting of the Minds at the University of Lethbridge.

Jacqueline E. Rice, PhD

Dean of the School of Graduate Studies and Postdoctoral Affairs
Associate Vice President (Research)
Professor of Computer Science

President of the University of Lethbridge Alumni Association

Cyndi Crane

On behalf of the University of Lethbridge Alumni Association, I am pleased to welcome you to the Graduate Students' Association's annual Meeting of the Minds Conference, taking place March 20 and 21, 2026.

As a proud alum of the University of Lethbridge graduate program, it is especially meaningful to see graduate students coming together to share their work and celebrate academic discovery. My time at the university provided me with valuable opportunities to learn, grow, and engage with a supportive community of scholars. I continue to appreciate the experiences and connections that shaped my journey, both personally and professionally.

This conference is a wonderful opportunity to recognize the breadth of research, creativity, and innovation happening across our campus. Through short talks and poster presentations, graduate students from a wide range of disciplines will highlight the important work they are doing to expand knowledge and address real-world challenges.

The University of Lethbridge community is strengthened by the dedication and curiosity of its graduate students, and Meeting of the Minds offers a meaningful space to learn from one another, connect across departments, and engage with new ideas.

I encourage alumni and community members to take part in this inspiring event and support the next generation of researchers and leaders. Thank you to the Graduate Students' Association for continuing to provide this important platform for discovery and collaboration. I wish all presenters, attendees, and organizers a successful and rewarding conference.

Cyndi Crane, BMus, MEd

President of the Alumni Association
University of Lethbridge

University of Lethbridge Graduate Students' Association President: Jade Oldfield

It is my great pleasure to welcome you to this year's Graduate Student Association Conference. This year we celebrate graduate student accomplishments, past and present, through the theme: Future in Focus: Celebrating the past and shaping the future of Graduate Studies at ULeth. This theme reflects not only the 20-year milestone of this conference, but also the clarity that comes from reflecting on where we began and the vision to image what's yet to come.

Graduate scholarship at University of Lethbridge has always been driven by curiosity, rigor, and a willingness to ask difficult questions. Over the years, our graduate students have advanced knowledge across disciplines, challenged assumptions, and contributed meaningfully to communities both within and beyond our campus. From the first two master degrees awarded in 1986, to the almost 150 degrees awarded during the 25/26 academic year, our collective strength is the ability to inquire, investigate, and iterate with the goal of both internal and institutional growth.

This year's conference is not only to reflect on those foundations, but to sharpen our focus on what comes next. The future of graduate studies at ULeth is interdisciplinary, community-engaged, and innovative. It is shaped by researchers who see connections where others see boundaries, and strengthened by students who push the boundaries of knowledge, while supporting one another along the way.

As we look ahead, our task is clear: to continue building a graduate community that is inclusive, forward-thinking, and responsive to a rapidly changing world. That means fostering spaces where diverse perspectives are valued, where bold ideas are encouraged, and where scholarship translates into meaningful action.

This conference is a reflection of that vision. It showcases not only the excellence of our graduate researchers, but also the collaborative spirit that defines our Association.

Thank you for being part of this moment. Together, we honour our past, celebrate our present achievements, and keep our future in focus.

Jade Oldfield

President, Graduate Student Association
University of Lethbridge

Keynote Spotlight

University of Lethbridge

Don't Miss the Keynote Session!

Selective Defluorination as an Entry Point to Unique Reactivity

Dr. Jean-Denys Hamel

Jean-Denys Hamel is the Tier 2 Canada Research Chair in Organofluorine Chemistry and Catalysis and is an Assistant Professor at the University of Lethbridge since 2021. He is the Associate Director of the Canadian Centre for Research in Advanced Fluorine Technologies (C-CRAFT), and he is a Member of the Science of Synthesis Early-Career Advisory Board. He received his Ph.D. in Chemistry in 2018 after completing organofluorine chemistry research and was the recipient of numerous awards that culminated in a prestigious Vanier Canada Graduate Scholarship (2015-2018).

Later, he secured an FRQNT postdoctoral fellowship to undertake work at the University of California – Berkeley (USA; 2018-2020). Now an independent researcher, he studies new synthetic methods to create and modify organofluorine compounds, supporting molecule development in academic and industrial R&D. He has co-authored 25 publications and book chapters, and his group has delivered >85 presentations on organofluorine chemistry since 2021.

Saturday 5 - 5:50 PM

20th MEETING OF THE MINDS Anniversary

Special Guests Speakers

Dr. Jacqueline Rice

Dr. Jacqueline Rice will be speaking on reflecting on the past, present, and future of the School of Graduate Studies, including its development, current priorities, and future direction.

Alex Engel

Alex Engel will be speaking on funding opportunities for graduate students and strategies for securing financial support.

20th Anniversary Meeting of the Minds Speaker Schedule:

Friday March 20 – Saturday 21st, 2026

Schedule at a Glance

Friday

- Poster Presentations (1:00 pm – 4:00 pm)
- Mitacs Advisor Presentation (4:15 pm – 4:45 pm)
- Dean of SGS Presentation (TIME pm – TIME pm)

Saturday

- Oral Presentations (11:00 am – 4:40 pm)
- Keynote Address (5:00 pm – 5:50 pm)
- Dinner and Awards (5:50 pm – 7:00 pm)

FRIDAY: POSTER PRESENTATIONS

Eric Albers	Information-geometric classification of EEG signals with motor imagery tasks
Bisi Amanwi	Sex-specific transcriptional responses to a high-fat, high-sugar diet in mouse skeletal muscle
Rouaa Ahmed Suliman Mohamed Ali	An anatomical approach to studying the sensory abilities of a critically endangered species.
Upekkha Abhayarathne	Assessment of Spongospora subterranea in soil, rotational crops and weeds of southern Alberta using molecular methods
Chloe Brennan	Prevalence and Spread of Antimicrobial Resistance in Bovine Respiratory Disease Pathogens via Mobile Genetic Elements
Kyra Bruce	Negotiating Masculine Identities in Online Gym Communities and the Role of the Manosphere: A Qualitative Study of Albertan Men
Layton Byam	Association Between Religious Upbringing and Well-Being in 2SLGBTQ+ Adults: A Proposed Study
Matthew Cameron	Effects of LWW31 on translation initiation and its interaction with eIF5B
Ryley Chalack	Analyzing Engineered Amyloid Folds Using Electron Microscopy and AUC
Bentara Wadu Mesthrige De Silva	A Graph-Based Approach to Reducing Chemical Systems Without Losing Key Dynamics
Natasha Dhiman	Approximation of Zeta Function on the critical line
Brittnee Ellingson	Paternal Preconception Tactile Stimulation Modulates Medial Prefrontal Cortex Morphology in Young Offspring in a Sex- and Hemisphere-Dependent Manner in Long-Evans Rats
Beruwalage Fernando	Can Proteins Change the Fate of Cancer?
Roza Gabdullina	Development of an RNA Toehold Switch Assay for Clubroot Detection
Mary-Lou Gregoire	Paternal Pre-Conception Tactile Stimulation in Long-Evans Rats: Method Development for Thalamic Measurement in Offspring

Wilson Holt	Developing the C–H Functionalization of Monofluoroalkenes Towards Pseudopeptides
Amanda Huber	Formation of hippocampal neural ensembles during instrumental learning
Yagika Kaushik	When Internal Clocks Are Disrupted: Changes in Hippocampus Activity During Learning and Memory
Sandeep Kaur	Temporal Analysis of Novel Object Recognition Behavior in Control and hTau-KI Mice
Julian Ketler	Field evaluation of fungicides for control of black dot in potato
Letitia Koen	Macro-level Social Progress Index Scores and children's and adolescents' physical activity in low-, middle-, and high-income countries: An exploratory cross-sectional study using multilevel modelling
Alexandra Lennox	Lethbridge Youth Prosperity: Increasing Youth Worker Retention
Audra Lutterotti	Fluorinative Strain-Release 1,3-Difunctionalization of [1.1.1]Propellane
Matheson Mah	Resilience and Risk: Examining Resilience and Limit-Setting Behaviour in Sports Gambling
Jocelyn McKnight	'Let's Fight the Drums Because the Moon Is Fighting Me': A Cognitive and Corpus Study on Semantic Changes in War and Violence Vocabulary
Shara Merrill	Constructal Simulations: From Flow to Form
Amirhossein Moshrefi	Analysis of Alzheimer's Disease Progression with Psilocybin Treatment via Home Cage Behavioural Monitoring
Amirhossein Moshrefi	Data-Driven Inference of Honeybee Behavioural Dynamics using Automated Hive Monitoring
Ahmed Mohamedeen	Improving reasoning capabilities of Large Language models (LLMs) using Causal Chains
Jordyn Musial	The Clockwork Casino: Neural Signatures of Reinforcement in Slot Machine Play
Thamara Salazar Barrientos	Group 3 and 13 Phosphasalen Complexes: Synthesis and Reaction Chemistry

Grace Seeley	Concealing Faith in Queer Spaces: The Impact of Anti-Religious Stigma on Concealment, Health Outcomes, and Belonging in LGBTQ+ Communities
Jerrica Thompson	Synthesis of Group 13 Phosphasalen Complexes
Emily Trew	Pincer-Supported Cobalt Complexes
Makena Wood	Effects of Teachers' Strike on Adolescent Executive Function and Social-Emotional Competencies: Examining the Aftermath of the 2025 Alberta Teachers' Strike in a Grade 8 Population in Lethbridge, Alberta
Isabella Yip	Guard Your Heart: Lived Experiences of Sexual Shame, Coping, and Healing After Purity Culture
Vlad Zaitsev	An Exhaustive Search for Unbiased Skew-Type Hadamard Matrices of Order 36

SATURDAY SESSION SCHEDULE: ORAL PRESENTATIONS

SESSION 1 (11:00 – 12:30)

TIME	BMO AUDITORIUM	SA6008	SA6010	SA6012
11:10 AM	Lena Dabbas	Emma Neigel	Ty Dudas	Davide Pafumi
11:30 AM	Chelsea White	Jocelyn McKnight	Keva Klamer	Stacie Nelson
11:50 AM	Shara Merrill	Nikeet Pradhan	Jeroen Zewald	Dennis Toporkov
12:10 PM	Angela Brooks	Luiz Madeira	Akeem Bamigbola	Carrigan Dawson

SESSION 2 (1:15 – 2:45)

TIME	BMO AUDITORIUM	SA6008	SA6010	SA6012
1:15 PM	Mia Lahiji	Emily Lewis	Vicky Thwaites	Madison Gal
1:35 PM	Taylor Semeniuk	Daniela McGonigal	Erik Vilu	Brooke Third
1:55 PM	Genoa Alger	Nathan Fuehrer	Carmen Agenbacht	Madeleine Froehlich
2:15 PM	A K M Iftekhar Khalid	Dean Stewart	Maryam Kiakojouri	Danielle Low

SESSION 3 (3:00 – 4:40)

TIME	BMO AUDITORIUM	SA6008	SA6010	SA6012
3:00 PM	Kelly Liland	Sally Sade	Tara Laverty	Nicola Herman
3:20 PM	Heather Davis	Jane O'Connor	Valerie Lapointe	Milan Baral
3:40 PM	Chiedozie Alumona	Connor Bunnage	Anuradha Rai Chowdhury	
4:00 PM	Derek Novosad	Joshua Kuzminski		

FRIDAY: Poster Abstracts

SATURDAY: Oral Presentation Abstracts

BMO Auditorium

SA6008

SA6010

SA6012

POSTERS ABSTRACTS

FRIDAY

(Pages 24 – 60)

Information-geometric classification of EEG signals with motor imagery tasks

Eric Albers, Paul Marriott, Masami Tatsuno

In complex systems such as the brain, there is evidence that information is carried not only by the individual activations of components and their pairwise interactions, but also by higher-order interactions within the system. Promising tools for exploring these higher-order interactions in neural data come from a field of mathematics and statistics called information geometry (IG), which allows for the orthogonal decomposition of information across different orders of interaction beyond pairwise. IG methods have previously been successfully applied to the analysis of spike train data. Here, we apply them to an OpenNeuro human electroencephalography (EEG) dataset recorded during a motor imagery experiment. Participants were instructed to imagine sit-to-stand or stand-to-sit movements while sitting or standing, respectively, alongside control conditions where they imagined nothing. Using IG, we identified first-, second-, and third-order interactions among EEG channels during the first second of the motor imagery period. We then used the IG interactions from a single triplet of EEG channels as predictors in a linear discriminant analysis to classify the motor imagery and corresponding idle conditions in each of the two postures. The highest mean classification accuracy was achieved from including the entire hierarchy of interactions (73.42% across all participants and both postures) as opposed to only pairwise and lower order terms. This lends support to the idea that higher-order interactions could carry additional information not captured by pairwise and lower relations.

Sex-specific transcriptional responses to a high-fat, high-sugar diet in mouse skeletal muscle

Bisi Amanwi, Slava Ilnytskyy, Igor Kovalchuk, Olga Kovalchuk
Department of Biological Sciences, University of Lethbridge, Lethbridge, AB, Canada

The prevalence of non-communicable diseases has risen sharply with increased adherence to the Western diet (WD), which is characterized by high fat and sugar intake. While WD-associated liver pathologies have been extensively studied, the transcriptional alterations occurring in skeletal muscle in response to prolonged WD exposure remain poorly characterized. Growing evidence suggests that biological sex plays a critical role in metabolic disease development and progression, however sex-specific transcriptional responses in skeletal muscle remain less explored.

The objective of this study is to investigate sex-specific patterns of gene expression in skeletal muscle following exposure to a high-fat, high-sugar (HF/HS) diet. RNA-sequencing data from the skeletal muscle tissue of mouse models fed an HF/HS diet for 20, 40, and 60 weeks were analyzed alongside age-matched control animals maintained on a standard diet. Preprocessing included alignment, quality control, normalization, and filtering of low-abundance genes. Differential gene expression analysis was performed using DESeq2 in R to assess diet-associated transcriptional changes within male and female mice at each timepoint. Principal component analysis was used to explore major sources of variation, and functional interpretation was conducted using fast gene set enrichment analysis (fgsea) to identify biological pathways enriched in a sex- and time-dependent manner.

The focus of this work is on characterizing sex-specific transcriptional responses to prolonged HF/HS diet exposure across multiple timepoints, highlighting differences in pathway-level regulation between biological male and female skeletal muscle. This work provides a framework for understanding how different groups of individuals respond to dietary stress at the molecular level and provides a foundation for future translational analyses.

An anatomical approach to studying the sensory abilities of a critically endangered species

Rouaa Ahmed[1], Sara Citron[1], Aubrey Keirnan[2], Vera Weisbecker[2], Andrew N. Iwaniuk[1]
[1]Dept. Neuroscience, University of Lethbridge, Lethbridge, AB, Canada
[2]College of Natural Sciences and Engineering, Flinders University, Adelaide, SA, Australia

The anatomy of sensory systems offers valuable insight into how animals perceive and interact with their environment. This is especially true of endangered species in which behavioural and physiological testing is not possible. Here, we examined the anatomy of several sensory systems of the Plains-wanderer (Pedionomus torquatus), a critically endangered and unusual shorebird species endemic to Australia. By comparing the Plains-wanderer with some of its relatives, we estimated its likely olfactory, auditory, visual, and somatosensory abilities, providing new insights into its behaviour.

High resolution computer tomography x-ray (mCT) scans were obtained of several Plains-wanderer skulls and twenty-three other shorebird species. From the digitally reconstructed skulls, we measured the basicranial length, the diameter of the orbits, olfactory sulcus and trigeminal nerve (V) foramina including Ophthalmicus (V1) and Maxillomandibularis (V2 and V3), the endcochlear duct length, and the surface area of the auditory meatus. Measurements were averaged for bilateral structures.

In addition, we created digital endocasts, 3D reconstructions of the brains derived from the interior braincase of the skulls. We then measured the sizes of the optic lobes and olfactory bulbs, proxies of visual and olfactory processing, respectively. All data were then analyzed using phylogenetically informed analysis of covariance to account for shared evolutionary relationships and allometry. Preliminary results indicate that the Plains-wanderer does not differ in its visual, somatosensory, or olfactory systems from other shorebirds sampled. The Plains-wanderer does, however, have an unusual auditory system, which might be related to its low frequency vocalizations. This suggests that it has evolved into a novel sensory niche, unlike that of other shorebirds.

Assessment of *Spongospora subterranea* in soil, rotational crops and weeds of southern Alberta using molecular methods

Upekkha Abhayarathne, Muhammad Subhan Shafique, Beanka Jubane, Evan Anvik, Dmytro Yevtushenko and Michele Konschuh

Department of Biological Sciences, University of Lethbridge, 4401 University Drive W, Lethbridge, Alberta, T1K 3M4, Canada

In southern Alberta, potatoes are considered high-value crops that contribute substantially to value-added processing. Spongospora subterranea fsp. Suberranea (Sss) is Plasmodiophorida that causes powdery scab on potato tubers and galls on potato roots. Sss is also the only known vector of Potato Mop-Top Virus (PMTV), which reduces the quality of processed potato products. Sss produces long-lasting resting spores (cystosori) that can persist in the soil for many years, making disease management challenging. To mitigate disease pressure, producers rotate to other crops for three to six years between potato crops. While several crops have been reported as alternate hosts of Sss globally, the role of commonly used rotational crops in southern Alberta has not been fully explored. In this study, we assessed the host status of rotational crops and weeds in southern Alberta fields with a history of powdery scab. Six fields were followed from 2023 to 2025. Root samples from crops such as beans, winter wheat, faba beans, spring wheat, canola, and weeds were analyzed using conventional Polymerase Chain Reaction (PCR) to detect Sss. Root staining and microscopy were used to confirm infection and assess host compatibility. To date, we detected Sss in all rotational crop species and in many weed species tested. Additionally, soil inoculum levels of Sss were evaluated using quantitative Polymerase Chain Reaction (qPCR) before and after each cropping season. These results explore the potential role of rotational crops and weeds in the persistence of Sss in potato production systems. Understanding these host-pathogen interactions is important for developing more effective crop rotation strategies to manage powdery scab in southern Alberta. We hope to develop recommendations for non-host or trap crops to reduce Sss inoculum levels in local fields.

Prevalence and Spread of Antimicrobial Resistance in Bovine Respiratory Disease Pathogens via Mobile Genetic Elements

Chloe Brennan[1,7], Sara Andres-Lasheras[1], Sheryl Gow[2], Athanasios Zovoilis[3], Karen Schwartzkopf-Genswein[1], Brian Warr[4], Steve Hendrick[5], Greg Dimmers[6], Rahat Zaheer[1], Kim Stanford[7], Tim McAllister[1]

[1]Agriculture Agri-food Canada, Lethbridge Research Centre, Lethbridge AB, Canada
[2]Public Health Agency of Canada
[3]University of Manitoba
[4]Veterinary Agri-Health Services, Rocky View County
[5]Coaldale Veterinary Clinic
[6]Alberta Beef Health Solutions
[7]Department of Biological Sciences, University of Lethbridge, Lethbridge, AB, Canada

Bovine respiratory disease (BRD) is a multifactorial disease in beef and dairy cattle that significantly impacts the North American feedlot industry and is exacerbated by the emergence of antimicrobial resistance (AMR) in BRD-associated pathogens. BRD is primarily a polymicrobial infection involving *Pasteurella multocida, Mannheimia haemolytica, Histophilus somni*, and *Mycoplasma bovis*. These bacteria, typically commensals in the bovine nasopharyngeal microbiota, transition to pathogenic roles under stress or immune compromise, resulting in acute or chronic respiratory conditions. Notably, these pathogens carry antimicrobial resistance genes (ARGs) on mobile genetic elements (MGEs), particularly integrative and conjugative elements (ICEs). Emerging evidence further indicates that less-studied opportunistic pathogens *Bibersteinia trehalosi* and *Trueperella pyogenes*, also nasopharyngeal colonizers, may also act as reservoirs of ICE-associated ARGs.

This study aims to investigate the prevalence of these six BRD pathogens, their AMR phenotypes and genotypes, and their roles in disseminating AMR. Samples are being collected over a two-years period from feedlots across Southern Alberta including nasopharyngeal swabs from low- and high-risk cattle, clinical BRD cases, and clinically healthy individuals, as well as lung tissue samples obtained exclusively from BRD-associated mortalities. Detailed antimicrobial use metadata, including administration route, quantity, and purpose, are being documented. Lung and nasopharyngeal samples are processed by culture on tryptic soy agar media with sheep blood, with and without tetracycline or erythromycin supplementation. Presumptive isolates are confirmed via species-specific PCR and stored at -80°C for phenotypic profiling through antimicrobial susceptibility testing and genomic characterization of ARGs and ICEs through whole genome sequencing.

This project will provide critical insights into the epidemiology, genomic composition, and dissemination mechanisms of ICEs in BRD pathogens, informing strategies to mitigate AMR in the feedlot industry.

Negotiation Masculine Identities in Online Gym Communities and the Role of the Manosphere: A Qualitative Study of Albertan Men

Kyra Bruce
Master of Education in Counselling Psychology

Online gym communities are digital platforms, forums, and websites where individuals can engage with gym-related content. Evidence suggests that these communities function as spaces where men may internalize socially constructed muscular ideals and perform their masculine identities. Within these communities, masculinity is often linked to muscularity, social status, desirability, and adherence to gendered expectations, reflecting hegemonic masculinity norms. These norms intersect with ideologies emerging from the manosphere, a collection of online communities that promote traditional gender ideals, hierarchies among men, and hostile views toward women.

While online gym communities and manosphere-aligned ideologies have been studied separately, less is known about how these dynamics interact. This qualitative study explores how Albertan men construct and negotiate masculine identities within online gym communities and how manosphere-aligned ideologies are adopted or rejected in their accounts. Semi-structured interviews will be conducted with 10-12 Albertan men who actively participate in online gym communities.

Braun and Clarke's reflexive thematic analysis will be used to develop patterns of meaning across participant accounts. Findings may deepen our understanding of how manosphere-aligned ideals operate within online fitness culture and the impact this has on men. This understanding may inform future research and prevention strategies aimed at promoting more inclusive expressions of masculinity within online gym communities. Furthermore, findings may inform school-based policies and interventions by highlighting how young adults are exposed to and engage with manosphere-aligned ideologies online, offering insights for supporting younger men in masculinity negotiation.

Association Between Religious Upbringing and Well-Being in 2SLGBTQ+ Adults: A Proposed Study

Layton J. Byam & Dr. Christopher R. Dabbs

The proposed study will examine how religious background (still religious, left religion, never religious) impacts life satisfaction, mental health, social support, and resilience among queer people, and if leaving religion predicts differences in those outcomes. Religion continues to influence Canadian culture, with most Canadians reporting a religious affiliation. Many 2SLGBTQ+ individuals are raised within religious environments, even if they do not remain religious as adults. While religiosity in the general population has been associated with improved mental health and social support, these benefits often do not extend to 2SLGBTQ+ individuals. Religion, for 2SLGBTQ+, is usually a source of stigma-related stress, identity conflict, and relational divisions and has been associated with higher psychological distress, internalized stigma, and suicidality. Minority Stress Theory posits that stigma-related events and internal conflict contribute to elevated distress for 2SLGBTQ+ individuals. This suggests that religious involvement may shape an individual's well-being depending on their religious trajectory. Once approved, the study will aim to recruit a target sample of 450 2SLGBTQ+ individuals across Canada through community organizations, social media, and queer networks. Participants will be asked to report their religious upbringing and current religious status, along with completing measures of religious commitment, depression, anxiety, stress symptoms, life satisfaction, resilience, and social support. Data will be analyzed using multivariate statistical methods. The findings of this study could provide a deeper understanding of how religious trajectories affect the well-being of 2SLGBTQ+ individuals in Canada and promote the necessity of exploring religion, past or current, in mental health settings. The results may also support the need to strengthen social support and foster resilience among individuals who are leaving or remaining in religion. Ultimately, this research can inform the development of more affirming environments for 2SLGBTQ+ individuals, thus supporting broader goals of inclusion and community well-being.

Effects of LWW31 on translation initiation and its interaction with eIF5B

Matthew Cameron, Nehal Thakor
Department of Biological Sciences, University of Lethbridge

Translation initiation is highly regulated process in protein synthesis. Dysregulation of this process is found to play a role in cancer. This has led to an increased study into the factors and mechanisms that carry out translation initiation to better understand this disease. Eukaryotic initiation factor 5B (eIF5B) is one factor that has been implicated in cancer cell survival and proliferation in multiple forms of cancers. eIF5B is becoming a potential therapeutic target for cancer. Inhibitors of eIF5B are being investigated with the small molecule LWW31 having shown promising results in cell culture models of some form of cancers. The aim of the research is to study the biochemical interactions between eIF5B and LWW31 as well as study the effects LWW31 has on internal ribosome entry sites (IRES) mediated translation.

To study the biochemical interactions between eIF5B and LWW31, human eIF5B will be purified. Native polyacrylamide gel electrophoresis will be used to study the interaction between LWW31 and purified eIF5B. UV-visible spectrophotometry will be used to study the possible structural changes of purified eIF5B that occurs when LWW31 binds. Finally, a modified cellular thermal shift assay will be used on the cancerous cell line BT25 and the non-cancerous cell line BJ-5ta to observe target engagement between eIF5B and LWW31.

To study the effect of LWW31 on IRES-mediated translation, an in vitro translation assay will be performed using the BT25 cell line. In vitro transcription will also be performed to create the RNA needed for translation. In vitro translation will then be performed to determine the effects of LWW31 on translation efficiency.

This research will provide greater insight on the interaction between eIF5B and LWW31. It may provide useful information that can help in determining if LWW31 is suitable as an anti-cancer drug.

Analyzing Engineered Amyloid Folds Using Electron Microscopy and AUC

Ryley Chalack

Proteins are at risk for undergoing a structural transition from a normal to a toxic form, leading to synaptic dysfunction and breakdown of neuronal networks within the human brain. This neuronal disruption can become widespread and lead to the loss of memories, as well as the ability to learn and function within everyday life. This is what occurs in many neurodegenerative diseases, including Alzheimer's, Parkinson's, and Prion diseases, where multiple misfolded proteins accumulate across crucial brain regions, leading to the development of these diseases. While high-resolution structural

analysis (Cryo-EM and ssNMR) has described how proteins of the same type assemble into fibrils (homotypic amyloids), they have not fully explained how multiple species of proteins coexist and engage in cross-talk interactions, forming amyloids composed of different protein types (heterotypic amyloids). This gap is crucial as the presence of these heterotypic amyloids potentially accelerates toxic assembly formation and alters fibril structure and their function. This project builds a controlled engineered amyloid toolbox to identify structural determinants that enable heterotypic interactions that are driving disease progression. By manipulating naturally evolved functional beta-solenoid amyloid structures, using computer modelling, potential pathogenic amyloid features can be tested to determine their effects on fibril formation and stability. Three aims will be accomplished: (1) Recombinantly express, purify, and refold engineered amyloids with various structural features. (2) Define assembly state and morphology using negative-stain TEM and analytical ultracentrifugation to quantify sample heterogeneity and fibril size. (3) Quantify seeding capabilities using RT-QuIC-style assay, testing whether engineered fibrils accelerate misfolding of amyloid-β and tau-derived peptides. By mapping protective versus toxic surface epitopes that govern heterotypic interactions, this work will connect amyloid structure to protein-network propagation mechanisms central to neurodegeneration, leading to the development of therapeutics to halt toxic structural transitions.

A Graph-Based Approach to Reducing Chemical Systems Without Losing Key Dynamics

Bentara W.M.N.M. De Silva[1]
[1]Alberta RNA Research and Training Institute, Department of Chemistry and Biochemistry, University of Lethbridge.

A biochemical system includes a network of chemical reactions often exhibiting complex behaviors such as temporal oscillations, spatial patterns, and multistability (the ability of a system to exist in multiple stable states), the latter being essential for biological functions like cell differentiation and decision-making in gene regulation. Ordinary differential equations (ODEs) are commonly used to study system behaviour. Many classical approaches for studying these systems, which are typically large, require knowledge of all of the parameter values. The parameter values of these models are often unknown or difficult to measure, and even some details of the reaction networks may be uncertain. Qualitative stability analysis methods provide a powerful way to study these behaviors, offering significant advantages compared to many traditional approaches as they do not require precise knowledge of system parameters. Qualitative stability analysis methods often rely on a graph-based representation of interactions between chemical species known as an interaction graph, where nodes represent species and edges represent the effect (positive or negative) of one species on another. The main objective of this research is to implement a new model reduction method based on the analysis of interaction graphs. During simplification, we must ensure that the conditions that allow specific dynamic behaviors are preserved, which depend mainly on the presence of circuits, and their signs. An Oregonator-class model for oscillations in the photosensitive Belousov-Zhabotinsky (BZ) reaction due to Amemiya and coworkers is used in an initial exploration of possible reduction rules in interaction graphs. The original model contains five variables, which our reduction method simplifies to three variables while preserving the key dynamical behaviors of the system.

Approximation of Zeta Function on the critical line

Natasha Dhiman, Dr. Habiba Kadiri and Dr. Emily Quesada-Herrera

Number theory studies integer and prime numbers and has been at the heart of pure mathematics for millennia. It has later found applications, such as in cryptography, on which cybersecurity, for everyday activities such as the internet and financial transactions, relies on the complex patterns of prime numbers.

The Riemann zeta function is the key to understanding these patterns. The zeros of the Riemann zeta function are fundamental to this field due to their direct connection to the distribution of prime numbers. A central question remains: the Riemann Hypothesis, a pivotal conjecture stating that all non-trivial zeros of this function reside on the critical line in the complex plane, where Re(s) = 1/2.

Our research specifically addresses the Approximate Functional Equation (AFE), a vital tool for approximating the zeta function as a sum of two finite Dirichlet series. To use this equation in rigorous mathematical proofs, it is necessary to determine the explicit numerical bounds for the error term. General theorems often prove that these bounds exist, but they do not always provide the specific values needed for precise calculations.

Throughout this project, we have utilized techniques from both mathematical analysis and analytic number theory to deepen our understanding of the zeta function's properties. The primary contribution of this work is the derivation of explicit and improved bounds for the error term of the AFE. By providing more precise numerical estimates than previously available, our findings serve as a crucial ingredient for extending partial results toward the Riemann Hypothesis. Ultimately, these findings help clarify the behaviour of the function near the critical line and serve as a necessary step toward better understanding the connection between the zeta function and the distribution of prime numbers.

Paternal Preconception Tactile Stimulation Modulates Medial Prefrontal Cortex Morphology in Young Offspring in a Sex- and Hemisphere-Dependent Manner in Long-Evans Rats

Ellingson, B., Gassner, A., Loewen, H., & Gibb, R.

Negative pre-conception experiences are known to influence offspring development, but the effects of positive experiences are less understood. This study investigates whether paternal preconception tactile stimulation (PPCTS), a form of positive sensory enrichment, affects offspring brain development in Long-Evans rats. Adult male rats received tactile stimulation (TS) by gentle brushing of the dorsal fur for 15 minutes, three times daily, over a 14-day period, while control males were handled but did not receive TS. Following stimulation, sires were paired with naïve dams for one week of breeding. At postnatal day 21 (P21), 14 male and 16 female offspring were randomly selected for analysis. Brains were sectioned at 50 µm, stained with Cresyl Violet (Nissl), and volumetric measurements of the Cg3 region were obtained using stereology. Generalized linear models revealed no significant main effects of sex Wald $\chi^2(1) = 1.71$, $p = .169$, η^2_p or treatment Wald $\chi^2(1) = 3.30$, $p = .069$ for right Cg3 volume. However, the Sex *x* Treatment interaction was significant Wald $\chi^2(1) = 5.93$, $p = .015$, indicating treatment effects differed by sex. Parameter estimates revealed that PPCTS treated males had greater right Cg3 volume than females B = 0.63, SE = 0.26, 95% CI [0.12, 1.14], $p = .015$. For the left hemisphere, the Sex *x* Treatment interaction approached significance Wald $\chi^2(1) = 3.58$, $p = .058$. Follow-up one-way ANOVAs within males, indicated significantly greater Cg3 volume in PPCTS treated versus control males: right Cg3, $F(1,5) = 8.02$, $p = .037$, $\eta^2_p = .62$; left Cg3, $F(1,5) = 14.05$, $p = .013$, $\eta^2_p = .74$. These findings provide evidence that beneficial paternal experiences prior to conception can modulate offspring prefrontal cortical morphology, supporting intergenerational transmission of positive environmental exposures and highlighting the importance of paternal experience in brain development.

Can Proteins Change the Fate of Cancer?

Hirushika Fernando, Pavan Lakshmi Narasimha, Nehal Thakor
Department of Biological Sciences, University of Lethbridge

Cancer is driven by more than just damaged DNA; it also depends on how cells make proteins. Proteins control how fast cancer cells grow, how they move, how they invade surrounding tissue, and even how they resist chemotherapy. Because of this, scientists are increasingly asking an important question: Can targeting protein production change how cancer behaves?

In this study, we focused on a protein called eIF5B (Eukaryotic Initiation Factor 5B), which helps cells make other proteins, a process called translation, especially under stressful conditions. While eIF5B is known to support survival in some cancers, its role in oral squamous cell carcinoma (OSCC), a common and aggressive form of oral cancer, has not been well Explored.

Using mouse oral cancer cells, we reduced the levels of eIF5B and examined how the cancer cells responded. When eIF5B was depleted, cancer cells became more sensitive to the chemotherapy drug cisplatin, meaning they were less able to survive treatment. We also found that these cells grew more slowly, moved less, and were far less capable of invading surrounding tissue, key steps in cancer spread.

Together, these findings highlight eIF5B as a powerful contributor to cancer progression. By interfering with this single protein, multiple cancer-promoting behaviors were weakened. This work suggests that targeting protein production and eIF5B could open new doors for cancer therapy. Future studies will test this approach in animal models, bringing us one step closer to understanding whether controlling protein synthesis can truly change the fate of cancer.

Key words: OSCC, eIF5B, Protein control, cancer spread

Development of an RNA Toehold Switch Assay for Clubroot Detection

Roza Gabdullina

Clubroot is a serious disease affecting canola and other Brassica crops. Once established in the soil, it becomes extremely difficult to control, causing significant yield losses (up to 100% in some Alberta reports). Farmers are often forced to avoid planting susceptible crops altogether. To avoid economic losses, farmers need to know about this disease before investing in seed and fertilizer. But current diagnostic methods of clubroot, such as PCR, require expensive equipment and trained specialists, which limit their use in field settings.

The goal of this project is to develop a simple and affordable test for detecting clubroot directly in the field. The test is based on synthetic biosensors, called toehold switches. These switches remain off until they detect a specific RNA sequence of the clubroot pathogen. In the presence of the clubroot, the switch turns on and generates a visible fluorescent signal. Because the reaction occurs in a cell-free system, it does not require living cells, specialized equipment, or advanced training.

This research will involve developing and producing toehold switches that recognize the unique RNA signatures of the clubroot pathogen and confirming that they react only to clubroot and not to other plant or soil RNAs. The project will also develop a freeze-drying protocol of the test for convenient storage and field use.

By creating a rapid, accurate, and affordable diagnostic tool, this work will help farmers make informed planting decisions, reduce the use of unnecessary chemicals, and improve long-term crop resilience. This approach could be used for the detection of other crop diseases.

Paternal Pre-Conception Tactile Stimulation in Long-Evans Rats: Method Development for Thalamic Measurement in Offspring

Mary-Lou Gregoire, Heather Loewen, and Robbin Gibb
Department of Neuroscience, University of Lethbridge, Lethbridge, AB, Canada

Emerging evidence suggests that paternal experiences prior to conception can influence offspring development through epigenetic and neurobiological mechanisms. Tactile stimulation (TS), a potent modulator of sensory and stress-related neural pathways, has been shown to alter plasticity in brain regions including the thalamus—a key hub for sensory integration, arousal regulation, and early developmental processing. This study aimed to develop a precise and reproducible method to quantify thalamic volume in offspring following paternal pre-conception TS.

Adult male Long-Evans rats received TS (three 15-minute bouts/day of gentle dorsal and ventral fur brushing) for 14 consecutive days prior to mating. Control males were handled for an equivalent duration without TS. Each male was paired with a naïve control female, producing 16 litters (TS males × control females = 8; control males × control females = 8). Two male and two female offspring per litter were selected for behavioral testing during early postnatal, adolescent, and adult stages. Following behavioral assessments, 56 offspring were perfused and their brains processed using Golgi-Cox staining. Brain sections were scanned using the Hamamatsu NanoZoomer and analyzed in NDP.view2. Thalamic boundaries were delineated at anterior and posterior bregma levels using the Paxinos and Watson (1986) rat brain atlas, with guidance from anatomical landmarks and subregional differentiation described by Jenkins et al. (2018).

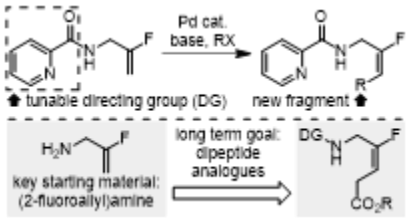
No significant difference was observed in anterior thalamic area between TS and control groups; however, a trend indicated that males exhibited larger anterior thalamic areas than females. This poster highlights a robust methodological pipeline developed to enhance anatomical precision in quantifying the thalamus in Golgi-Cox stained brains, which lack the cytoarchitectural clarity of cresyl violet staining. These methods provide a foundation for future Golgi-Cox stained studies to accurately measure thalamic volume and investigate how paternal sensory experiences influence offspring neurodevelopment and behavior.

Developing the C–H Functionalization of Monofluoroalkenes Towards Pseudopeptides

M. Wilson Holt[1], Jean-Denys Hamel[1]

[1]Department of Chemistry and Biochemistry, University of Lethbridge, 4401 University Drive West, Lethbridge, Alberta, Canada T1K 3M4

Our current pharmacopoeia has long been dominated by small-molecule drugs, but new possibilities are emerging through the use of therapeutic peptides such as pseudopeptides which possess modifications to the backbone of the peptide chain. Typically, these modifications are the replacement of one or several amide bonds by an isostere. In this context, the monofluoroalkene (MFA) motif is particularly promising for being a non-hydrolyzable isostere of amides. About 25% of pharmaceuticals currently on the market contain at least one fluorine atom that alters solubility, lipophilicity, conformational preferences and hydrogen-bonding ability to affect the drug's pharmacokinetics. A hurdle towards R&D on MFA-based pseudopeptides and their commercialization is the lack of general methods for their synthesis.



Functionalization of C–H bonds unlocks short reaction sequences. We hypothesize that (2-fluoroallyl)amine offers a unique opportunity as it might be amenable to C–H functionalization at its monofluoroalkene through the synergy of palladium catalysts and directing groups. We have already demonstrated computational feasibility of this process using picolinamides as directing groups.

The synthesis of (2-fluoroallyl)amine can be achieved by first converting methyl 2-fluoroacrylate to an alcohol and then to a phthalimide. This phthalimide can then be converted into (2-fluoroallyl)amine and protonated to form an ammonium salt for ease of storage. The salt can then be used in coupling reactions with various picolinic acids to synthesize a library of picolinamides. These picolinamides will be engaged with palladium species in stoichiometric assays to demonstrate coordination and oxidative addition – key steps of the process. From there, I will investigate catalytic conditions to activate the C–H bond at the alkene, gradually increasing the complexity of coupling partner up to α-bromoesters, which would give direct access to N,O-diprotected dipeptide analogues ready to use in pharmaceutical design. Current progress towards that goal will be presented.

Formation of hippocampal neural ensembles during instrumental learning

Amanda Huber[1], Yagika Kaushik[1], Charlize Koopman[1], Anja Gassner[1], Autumn McFetridge[1], and Robert J. McDonald[1]

[1]Canadian Centre for Behavioural Neuroscience, University of Lethbridge

The hippocampus is a region of the brain crucial for certain forms of learning and memory in which different elements of an experience are formed into coherent representations that can later be retrieved. In instrumental learning, an animal performs a behavioural response when a cue is present to receive a reward. The rewarded cue is a predictor for reward, while a non-rewarded cue is a non-predictor. There is evidence to suggest that although the hippocampus is not required for this task, it does gain information about the non-predictor cue and can associate it with the context, creating a context-specific inhibitory representation that reduces responding to that cue. The research goal of this study is to understand how the hippocampus is involved in context-specific inhibition by examining the formation of neural ensembles which can indicate what information is being learned.

To investigate, mice received an intrahippocampal infusion of a fluorescent calcium indicator and a lens was implanted into the dorsal hippocampus. The mice were imaged with a miniscope to allow for free-roaming behaviour in the operant chamber, and sugar water reward was given for lever presses during a light but no reward was given during a tone. The predicted result is that there will be hippocampal neural ensemble formation in response to the non-predictor cue but not to the predictor cue. This project will contribute to understanding normal learning and memory processes in mammals, which can have implications for when these processes become dysfunctional in various disease states.

When Internal Clocks Are Disrupted: Changes in Hippocampus Activity During Learning and Memory

Y. Kaushik[1], D.R. Robertson[1], A. Huber[1], I.D.M. Esteves[1], H. Chang[2], S.H. Deibel[3], N.S. Hong[1], R.J. McDonald[1]

[1]University of Lethbridge, Department of Neuroscience, Lethbridge, Canada, [2]University of Freiburg, Institute for Physiology, Freiburg, Germany, [3]University of New Brunswick, Department of Psychology, New Brunswick, Canada

Circadian rhythms modulate hippocampal activity and memory consolidation, yet how circadian disruption affects consolidation at the circuit level remains unclear. We performed longitudinal calcium imaging in the hippocampus of twelve male Thy1-GCaMP6f mice performing a spatial foraging task under either stable light–dark cycles (controls) or a repeated 3-hour daily phase advance (T21) for seven days, followed by a return to stable lighting (circadian-shifted). During initial encoding, both groups accurately represented spatial positions, and population-level decoding remained robust. However, across days, circadian-shifted animals showed reduced place cell stability and higher decoding error. At retention tests 7 and 23 days later, circadian-shifted mice showed reduced spatial information and a higher sparsity index (lower spatial selectivity), despite largely intact spatial maps, indicating a gradual degradation of spatial representation. To test whether this degradation was related to altered offline processing, we analyzed place-cell coactivity during active behaviour and rest periods before and after running. In controls, similarity between run activity and subsequent rest increased across days, while pre-to-post rest similarity remained moderate, consistent with experience-dependent reactivation. In circadian-shifted mice, pre-to-post rest similarity remained significantly higher relative to run-to-post rest similarity, indicating that rest dynamics were more internally stable and less tightly coupled to recent spatial experience. This pattern emerged during training, persisted transiently after the disruption ended, and gradually normalized at later retention time points. Together, these results demonstrate coordinated changes in place-cell stability during behaviour and offline network organization that may underlie the progressive degradation of spatial memory following circadian rhythm disruption.

Temporal Analysis of Novel Object Recognition Behavior in Control and hTau-KI Mice

Sandeep Kaur, Robert Sutherland, Hardeep Ryait, Ian Q. Whishaw

Novel Object Recognition (NOR) is a widely used behavioral paradigm for assessing memory in rodents. In this task, an animal explores a test box containing two objects for five minutes. In a second test conducted the following day, one object is replaced with a novel object. Greater exploration of the novel object indicates recognition of novelty and memory for the familiar object, making NOR a test of memory.

The purpose of this study was to develop an analytical procedure that provides a more comprehensive assessment than object memory alone by measuring multiple behaviors displayed by mice during the task. The study included 10 control mice and 10 hTau-KI mice, which were genetically modified to display an Alzheimer phenotype. It was expected that control mice would explore the novel object more than the familiar object, whereas Alzheimer-prone mice would show impaired recognition of the novel object.

To achieve a complete behavioral assessment, mouse movement was digitized using a computer-based artificial intelligence and deep-learning-driven measurement system. Behavioral measures were quantified minute by minute and included: (1) time spent examining objects as a measure of memory, (2) total distance traveled as a measure of overall activity, (3) time spent in corners as a measure of timidity, (4) time spent in central regions as a measure of bravery, (5) time spent near the walls as a measure of thigmotaxis, and (6) the number of times in which the animals looked at the test objects as a measure of general interest.

The results show that this combination of measures can serve as a phenotypic profile of overall mouse behavior. Data from 8-month-old mice suggest this approach could prove for detecting early memory impairment in Alzheimer mice.

Field evaluation of fungicides for control of black dot in potato

Julian A. Ketler, Michele Konschuh and, Dmytro Yevtushenko
Department of Biological Sciences, University of Lethbridge, Lethbridge, AB, Canada

Soilborne diseases are a common problem when growing crops worldwide. Many soilborne diseases have features that make them difficult to suppress once they have appeared in crop fields. One such disease is potato black dot caused by the pathogenic fungus Colletotrichum coccodes, which can affect potatoes through skin blemishing and necrotic tissue. Despite its obvious symptoms on the plants themselves once present, it is a very elusive pathogen as even heavily infected plants are often asymptomatic until the end of the growing season. Additionally, C. coccodes is often confused with a different, more easily controlled pathogen causing silver scurf despite being generally more prevalent than the latter. C. coccodes may contribute to disease complexes such as potato early dying, although the mechanism of such interactions is not well known. Evaluation of different fungicide formulations to determine which treatments work more effectively is an important factor in managing this disease. In this study, fungicides with different formulations and applications methods were tested on potatoes under local field conditions. This was done both through in-furrow applications of fungicide and C. coccodes inoculum, and through foliar application and inoculation. These methods were designed to test for protection of plants against different infection pathways. The potatoes were monitored for disease symptom development throughout the growing season alongside in vitro culturing to identify whether the pathogen was present in the internal tissues of the plants. Once fully grown, harvested and stored, the tubers were scored for disease incidence and severity. Stem tissues, cultured in vitro, confirmed successful infection by C. coccodes, with some treatments showing a reduced stem infection rate. The incidence and severity of symptoms on the harvested tubers was not significantly different between the treatments. The results of this study is a step towards enhancing our understanding of black dot management in Alberta.

Macro-level Social Progress Index Scores and children's and adolescents' physical activity in low-, middle-, and high-income countries: An exploratory cross-sectional study using multilevel modelling

Letitia Koen, BHSc., LPN, MSc. Candidate

The high prevalence of physical inactivity among children and adolescents worldwide is a significant concern for public and global health, as it is a substantial contributor to premature mortality and adverse mental, social, and physical health outcomes across the life course. Despite ongoing research and efforts to improve children's and adolescents' physical activity (PA), studies focus more on individual-focused determinants with little attention to broader structural factors that may influence PA, and are primarily concentrated in high-income countries, limiting accurate cross-national comparisons, generalizability, and targeted interventions.

This study examines the associations between Social Progress Index (SPI) indicators, a macro-level and multidimensional measure of societal well-being, and children's and adolescents' individual self-reported and device-measured PA from diverse countries.

Using a cross-sectional design, secondary data from the 2025 AlTi Global SPI and the Global Adolescent and Child Physical Activity Questionnaire (GAC-PAQ) project are utilized to examine the associations between SPI scores and ~8000 children's and adolescents' (aged 8 to 17 years) overall device-measured, self-reported, and domain-specific PA levels in 16 low-, middle-, and high-income countries. Generalized linear mixed models, with children nested within countries, are used to examine associations while controlling for sex, gender, age, parents' education, perceived income adequacy, and urbanicity. Results are also stratified by sex/gender, age, and country-income group.

A positive association between SPI scores and participation in activities like sports and active play is anticipated, and a negative association with activities such as chores and active transportation.

Using comprehensive SPI indicators and considering the global scope and large sample size of the GAC-PAQ project, this study may broaden our understanding and help identify overlooked country-level correlates of children's and adolescents' PA in diverse countries, which is essential for future research, policies, and interventions to promote PA in children and adolescents.

Lethbridge Youth Prosperity: Increasing Youth Worker Retention

Cruz Campbell, Viki Walle, Alexandra Lennox

Youth underemployment and unemployment following post-secondary graduation are a persistent economic challenge worldwide. This issue is relevant in Lethbridge, due to its transient student population and municipal concerns regarding graduate retention. This research project was conducted at the University of Lethbridge in partnership with the City of Lethbridge. The objective of the project was to conduct research on United Nations Sustainable Development Goal 8, which promotes sustainable economic growth, full and productive employment, and decent work for all, and to prepare an intervention proposal with a focus on student retention in Lethbridge.

This research project utilized qualitative methods, including conducting interviews with eight industry experts and employers, four youth participants, three City of Lethbridge representatives, and one Indigenous knowledge keeper. The research focused on identifying barriers to youth employment and student retention in Lethbridge.

The research findings reveal that a significant communication gap between youth and employers contributes to municipal economic inefficiencies, including (1) youth unemployment and underemployment and (2) student retention challenges. The most influential factors were (1) inadequate compensation and (2) poor person–organization fit caused by insufficient engagement between employers and students. The research team developed (1) engagement posters linking to a youth assessment survey, (2) assessment surveys for local employers, (3) a record of local establishments willing to display the posters, and (4) an educational archive for youth on educational and employment opportunities in Lethbridge.

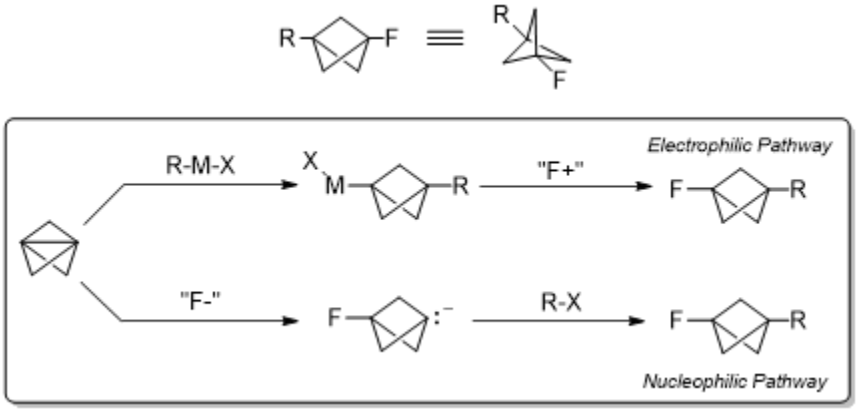
This project addressed a municipal economic issue by utilizing research findings to develop an intervention proposal to bridge the communication gap between employers and youth. These materials provide a framework for improving student retention in Lethbridge and have the potential to enhance municipal economic growth and community development.

Fluorinative strain-release 1,3-difunctionalization of [1.1.1]propellane

A. Lutterotti, J.-D. Hamel*

Canadian Centre for Research in Advanced Fluorine Technologies, University of Lethbridge
Department of Chemistry and Biochemistry, University of Lethbridge

Phenyl rings are one of the most common structural units found in synthetic organic molecules. However, what if there was a unit that has similar geometric qualities, but which holds amplified 3D characteristics, making it a better candidate for drug design through improved pharmacokinetics? In this context, the 1,3-disubstituted bicyclo[1.1.1]pentane (BCP) motif can act as an isostere of para-disubstituted phenyl rings. With our group's interest in organofluorine compounds, we sought a method to prepare fluorinated BCP derivatives.



The strained central bond of [1.1.1]propellane is the point of interest of our reaction design due to its potential for strain-release difunctionalization, which introduces in one step the substituents at the 1 and 3 positions of BCPs. Once the synthesis of propellane had been optimized, suitable nucleophiles were identified that would break the central bond towards difunctionalization. Investigation of both the nucleophilic and electrophilic pathways will provide insight into which is most suitable for fluorinative difunctionalization. The next stage of the work will be optimization of the suitable pathway with the intention of isolating and characterizing the F-BCP product.

Resilience and Risk: Examining Resilience and Limit-Setting Behaviour in Sports Gambling

Matheson Mah
Department of Education, University of Lethbridge

The rapid expansion and normalization of sports gambling has raised increasing public health concerns, particularly for young men who engage in betting at disproportionately high rates. Research consistently links emotion regulation difficulties with risky gambling behaviour; however, less is known about whether resilience functions as a protective factor or influences engagement in harm-reduction strategies. This study examines whether resilience moderates the relationship between emotion regulation difficulties and risky sports gambling behaviour and explores young men's use of limit-setting features on sports betting platforms. Using a cross-sectional mixed-method survey design, data will be collected from young adult men aged 18–25 who have placed at least one sports bet in the past three months. Participants will complete validated measures of sports gambling severity, emotion regulation difficulties, and resilience, alongside researcher-developed questions assessing engagement in limit-setting practices. Quantitative analyses will test moderation effects between emotional dysregulation, resilience, and gambling risk, while exploratory analyses will examine whether resilience or emotion regulation predicts participation in limit-setting behaviours. Guided by self-determination theory, this study aims to clarify how psychological vulnerabilities and protective factors interact within contemporary digital sports gambling environments. Findings are expected to inform public health strategies, platform design, and policy initiatives aimed at promoting safer gambling practices among young men.

'Let's Fight the Drums Because the Moon Is Fighting Me': A Cognitive and Corpus Study on Semantic Changes in War and Violence Vocabulary

Jocelyn McKnight, BA Student in English, University of Lethbridge

From its early development, catalyzed by mass displacement and forced relocation of Melanesian people, Tok Pisin has flourished into a thriving language of mixed origins in Papua New Guinea. This paper presents a semantic analysis of the vocabulary associated with war and violence, while focusing on how the lexical items have undergone polysemy and meaning extensions in Tok Pisin.

The paper's methodology combines three complementary approaches within the theoretical framework of Cognitive Linguistics. (1) The first approach is adapted etymological tracing for composite languages (Mühlhäusler 1984), which is used to reconstruct the diachronic development of the lexemes. This approach accounts for phonological, semantic, and structural blending as well as possible convergence with semantically related forms. (2) The second approach consists of applying semantic analysis grounded in Cognitive Linguistics to classify changes and identify how meaning extensions emerge through conceptual associations. Specifically, this paper examines metonymy (Ruiz de Mendoza 2000), such as striking action for rhythmic activity (e.g., paitim kundu 'beat the drum'), and metaphor (Lakoff & Johnson 1980), like argument is war, in an attempt to classify the polysemy and semantic changes occurring. (3) The third approach integrates corpus linguistics methods, using concordance tools to examine usage patterns in the Slone Corpus (Slone 2001). It is comprised of 873,347 tokens and focuses on traditional Tok Pisin folktales from 1972–1997 in Wantok Newspaper and is compared with dictionary data from Mihalic (1971).

Together, these approaches reveal how verbs related to war and violence have undergone systematic semantic extension through usage, etymological layering, and cognitively motivated polysemy in Tok Pisin. Ultimately, this paper contributes to etymological studies for contact languages and cognitive semantics by modelling how lexical meaning develops, stabilizes and grows within a mixed language.

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Constructal Simulations: From Flow to Form

Shara Merrill

This interactive poster presents a suite of real-time simulations exploring principles from Constructal Theory: the tendency of flow systems to evolve toward configurations that facilitate easier access over time. Rather than presenting static diagrams, the poster functions as a "Constructal Arcade," allowing viewers to activate, observe and interact with simple rule-based simulations in which complex, branching, and path-dependent structures emerge from simple starting conditions.

Using lightweight, game-based modeling tools, the simulations demonstrate how repeated movement, resistance, accumulation, and feedback can generate recognizable patterns such as channels, networks, and hierarchies—without centralized control or optimization.

Examples include path formation through repeated use, flow acceleration through worn channels, and branching driven by local constraints.

The poster emphasizes constructal principles as a general explanatory framework applicable across physical, biological, and social systems, and invites participants to explore how flow, constraint, and feedback interact to produce stable forms. By making these dynamics visible and interactive, the project aims to demonstrate constructal theory both as an educational tool and as a cross-disciplinary lens for understanding emergence in complex systems.

Analysis of Alzheimer's Disease Progression with Psilocybin Treatment via Home Cage Behavioural Monitoring

Amirhossein Moshrefi, Lucas Ferrari do Amaral, Kartik Iyer, Hardeep Ryait, Robert Sutherland
Canadian Centre for Behavioural Neuroscience, Department of Neuroscience, University of Lethbridge

Alzheimer's disease progression can present as gradual changes in mobility, daily routines, and engagement. Conventional rodent assays are brief and experimenter-led, while continuous home-cage monitoring is more naturalistic but produces datasets that are impractical to annotate manually. We developed an automated workflow to quantify home-cage behaviour and compared No Drug versus psilocybin conditions.

An automated AI-based video analysis pipeline (utilizing SAM3 mask-based segmentation) tracked multiple mice and labeled behaviors within predefined regions of interest (sleep, entertainment, eating, drinking, other). The system generated annotated trajectories, movement metrics, and time allocation logs without manual scoring. Experimental groups included "No Drug" (control) and "With Drug" (psilocybin).

Compared with No Drug, psilocybin increased time in entertainment (12.8% vs 5.7%; 420.0 vs 190.9 min), eating (7.8% vs 5.3%; 254.5 vs 176.2 min) and drinking (6.5% vs 5.5%; 212.3 vs 182.5 min), and reduced sleep (36.4% vs 38.5%; 1196.3 vs 1280.1 min) and other/inactive behaviour (36.6% vs 45.0%; 1200.6 vs 1495.4 min). Movement increased (+91.8%; 10,807 vs 5,635 pixels). Automated home-cage behavioural monitoring enables scalable, low-stress, longitudinal phenotyping and detected increased activity/engagement with psilocybin, supporting its use for tracking Alzheimer's-related change and treatment effects.

Data-Driven Inference of Honeybee Behavioural Dynamics using Automated Hive Monitoring

Amirhossein Moshrefi, Olabola Balogun, Kartik Iyer, Hardeep Ryait
Canadian Centre for Behavioural Neuroscience, Department of Neuroscience, University of Lethbridge

Honeybee monitoring is transitioning from episodic inspections to continuous sensing, but a state-of-the-art challenge is converting raw sensor streams into interpretable, management-relevant behavioral states. We developed an automation system that ingests continuous hive-scale weight, internal temperature, and relative humidity data and outputs standardized indices for foraging intensity, thermoregulation, and nectar ventilation. The pipeline segments time series into morning, afternoon, evening, and night, applies automated preprocessing, and extracts diurnal features including weight-cycle amplitude, net daily gain, internal-climate stability, and temperature-humidity phase coupling. The workflow performs quality control (gap detection, sensor-drift/outlier screening, weight-cycle amplitude, internal climate stability, temperature-humidity cross-correlations) and generates alerts for biologically plausible events. These features are combined into interpretable Foraging scores for dashboard reporting and cross-site comparison.

We evaluated the approach on 12 colonies across three commercial apiary sites in Alberta during June-August 2025. Okotoks showed the greatest environmental forcing (10-35 °C, 20-90% RH) with strong inverse temperature–humidity cycles and net cumulative weight loss in most colonies, although short windows of gain occurred. Strathmore exhibited buffered moisture conditions (typically 40-85% RH) and consistently positive cumulative weight trajectories with regular daily weight oscillations indicative of sustained foraging and nectar return. Lower Cross presented a persistently humid microclimate (60-85% RH) with distinct short-term weight increases around August 12-13. Across sites, in-hive humidity rises frequently coincided with positive weight deltas, yielding an automated signature consistent with nectar influx and honey ripening, colonies with stronger diurnal weight cycles also tended to maintain more stable internal conditions consistent with brood-rearing set-points (~30-33 °C).

Overall, these results demonstrate a scalable, low-disruption, multi-site pipeline that converts BeeCube sensor streams from simple networks into interpretable colony behavioral-state alerts, enabling near-real-time automated inference, monitoring, and objective comparison of collective colony dynamics along with early warning of stress, equipment issues, and production-relevant states under variable environmental conditions.

Improving reasoning capabilities of Large Language models (LLMs) using Causal Chains

Ahmed Mohamedeen, Dr. Ylias Chali

Evidently, LLMs hallucinate when faced with tasks that are equivocal in nature. They often rely on past knowledge -data they were trained on- and some latent patterns in text, these happen to be misleading in most of the reasoning tasks and challenges proposed by Research.

One heavily discussed reasoning challenge is the conjunction fallacy, it is a cognitive bias where individuals incorrectly judge a specific combination of events as more probable than a single, more general event; Famously illustrated by the "Linda Problem" a woman named Linda — described as outspoken, bright, and concerned with social justice, the question is to rank the likelihood of two scenarios:
A. Linda is a bank teller.
B. Linda is a bank teller and active in the feminist movement.

The fallacy here is that humans (and early NLP models) often wrongly chose the second, more detailed option; Even though the probability of both A and B happening together (A + B) is constrained by the probability of A alone, and in most cases (always), it is smaller.

The challenge with this specific fallacy with LLMs are two things, with the amount of literature done on the Linda problem, Large models have mistakenly given how often it appears in the training data-took the "Linda" name in particular and often call you out on the conjunction fallacy even when the given question is not really a conjunction fallacy. The second challenge is that Small Language Models do not even catch the classic fallacy given how compressed the knowledge is.

My work specifically focuses on improving how reasoning tasks are reasoned on by LLMs using Causal Event Graphs. Where I built datasets framing reasoning tasks into Cause→Effect chains and re-trained small language models, supported by my findings, adding this thoughtful, structured guidance rather than the plain text chain-of-thought shows significant improvements in causal reasoning, even with large language models that are closed and proprietary they showed more robust results when prompted and directed to think in causal chains.

The Clockwork Casino: Neural Signatures of Reinforcement in Slot Machine Play

Jordyn Musial, Chelsea Ekstrand, David Euston
Department of Neuroscience, University of Lethbridge

This project will investigate how different reward schedules in slot machines shape gambling persistence and associated brain activity, focusing on structural features of games rather than clinical gambler status. Contemporary slot machines typically use random ratio schedules, yet there has been surprisingly little direct comparison of human behaviour and neural responses across different ratio schedules, leaving open how and why these designs promote persistent engagement. This study addresses that gap using a two-experiment design that combines a large online behavioural experiment with a laboratory fMRI experiment built around the same simulated slot machine task.

In Experiment 1, 300 online participants will complete a custom slot machine task that alternates blocks of fixed ratio and random ratio reward schedules matched on overall payout, allowing precise tests of how uncertainty in reward timing influences choice behaviour, trial-by-trial persistence, and subjective evaluations of play. Key behavioural outcomes will include response rates, post-reinforcement pauses, and self-reported task engagement and preference, providing detailed data to identify schedule features that promote continued play even under economically equivalent conditions.

In Experiment 2, 80 participants will complete an fMRI-adapted version of the same task, enabling analysis of how schedule-driven uncertainty modulates activity in core reward-learning circuits, including ventral striatum and medial prefrontal regions. Analyses will test whether random ratio play amplifies activity in these regions during wins and near-misses compared to fixed ratio play, and whether this heightened responsivity tracks individual differences in gambling persistence and subjective preference for the task. By isolating the impact of reinforcement schedule structure on both behaviour and brain function, this project aims to clarify why certain game designs are especially engaging and to provide mechanistic evidence that can inform safer slot machine design and gambling policy discussions.

Group 3 and 13 Phosphasalen Complexes: Synthesis and Reaction Chemistry

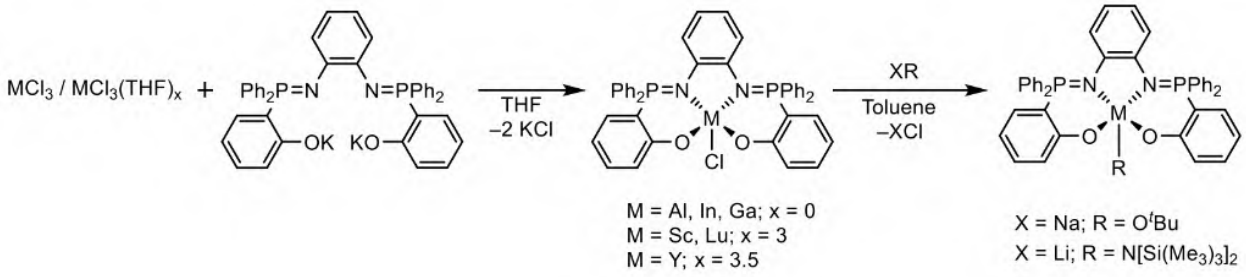
Thamara V. Salazar-Barrientos[1], Paul G. Hayes[1]

[1]Department of Chemistry and Biochemistry, University of Lethbridge, 4401 University Drive West, Lethbridge, Alberta, Canada T1K 3M4

Conventional plastics, such as polyethylene, are ubiquitous in our daily lives. Unfortunately, these materials present the challenge of not being biodegradable, consequently, accumulating in landfills, dump sites, and the oceans. Therefore, the search for new biodegradable alternatives is paramount to sustainability on the global scale.[1] Polylactides are biodegradable, due to the ability to decompose into low molecular weight oligomers and lactic acid. Notably, lactide monomers can be synthesized from natural sources, such as wheat, corn and sugar beets.[2]

Phosphasalen ligands contain an iminophosphorane ($RN{=}PR_3$) functionality. Such groups are strongly electron donating, and thereby these scaffolds bind tightly to an array of metals.[3] Unlike related salen ligands, phosphasalens are generally stable under harsh conditions, are extremely electron donating, and possesses a ^{31}P nucleus which is valuable for characterization. Metal complexes of phosphasalen ligands have been reported and have been demonstrated to mediate the ring-opening polymerization (ROP) of cyclic esters, *e.g.* poly-lactide. However, these complexes have only been prepared using group 3 metals.[4, 5]

The Hayes group has reported a route to generate a variety of phosphasalen-type ligands using a modified Staudinger reaction.[6] This work focuses on developing a phosphasalen ligand with a rigid aromatic core. Fine-tuning of steric and electronic properties will increase understanding of the structure-activity relationship, particularly the role that Lewis acidity plays with respect to reactivity in these systems. A series of group 3 and 13 metal complexes of phosphasalen complexes have been prepared. The synthesis and characterization of these species, as well as preliminary reaction chemistry with alkoxide and amides, will be discussed.



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Concealing Faith in Queer Spaces: The Impact of Anti-Religious Stigma on Concealment, Health Outcomes, and Belonging in LGBTQ+ Communities

Grace Seeley, Dr. Chris Dabbs
Faculty of Education, University of Lethbridge.

The proposed study examines the differentiated benefits of LGBTQ community connection within religious and/or spiritual (RS) sexual and gender minorities (SGMs), a large but understudied population. Empirical work has documented the presence of pronounced anti-religious stigma within queer communities. Research indicates that, when stigmatized identities are concealable (e.g., religious belief), individuals will hide these identities to maintain social belonging and avoid discrimination. Although a strategy to maintain belonging, concealing a stigmatized identity paradoxically reduces feelings of belonging and is associated with poorer health outcomes. Thus, RS identity concealment may contribute to a diminished sense of belonging within queer communities and, in turn, may help explain poorer health outcomes observed in RS SGMs. A survey comprising standardized scales and open-ended questions will be disseminated to adult participants who self-identify as both SGM and RS. Mediational regression analyses will be conducted to test indirect effects, and follow-up group comparisons will be carried out to further explore quantitative data. Written survey responses will be analyzed using Braun and Clarke's reflexive thematic analysis. It is expected that religious identity concealment will partially mediate the relationship between perceived anti-religious stigma and sense of belonging to LGBTQ communities. Furthermore, it is expected that participants who engage in religious identity concealment will report diminished feelings of belonging and reduced health outcomes. Insight into the factors that contribute to inequitable health benefits of LGBTQ communities can inform service providers, institutions, and program developers, as well as guide policies targeting the mental health needs of a group experiencing significant health disparities. As Canada's LGBTQ population becomes increasingly diverse, this project helps ensure that the health-promoting potential of LGBTQ communities is accessible to a broader range of SGM individuals, not only those whose identities align with dominant norms.

Synthesis of Group 13 Phosphasalen Complexes

Jerrica Thompson

Department of Chemistry and Biochemistry, University of Lethbridge

The development of efficient and sustainable catalysts is important for addressing global challenges associated with plastic pollution and relience on non-renewable resources. Conventional petroleum derived plastics contribute significantly to environmental waste motivating the use of biodegradable alternatives, such as polylactide (PLA).[1] However, the cost-effective production of PLA depends on the availability of catalysts that exhibit high activity and selectivity.[1]

Ligand design plays a critical role in fine-tuning catalyst performance. Phosphasalen ligands which incorporate iminophosphorane ($RN=PR_3$) units (in place of traditional imine ($RN=CR_2$) functionalities), enhance electronic donation to metal centers.[2] As a result, phosphasalen frameworks are capable of stabilizing a variety of metal complexes, including those of yttrium and indium.[3] Notably, metal complexes supported by phosphasalen ligands have demonstrated exceptional ability to mediate the ring-opening polymerization of lactides, an essential step in PLA production.[4] The Hayes group has previously utilized the Staudinger reaction for preparing several families of iminophosphorane-containing ancillary ligands.[5] Building on this work, the present study employs the phosphasalen ligand 1,2-$N=PPh_2(2\text{-}OK\text{-}C_6H_4)_2C_6H_4$) to support a series of group 13 metal complexes. In addition, the synthesis of a new phosphasalan ligand (1,2-$N=P^tBu_2(2\text{-}NMe_2\text{-}C_6H_4)_2C_6H_4$) is being explored. The synthesis and characterization of these species will be presented in detail.

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Pincer-Supported Cobalt Complexes

Emily L. Trew[1] and Paul G. Hayes[1]*

[1]Department of Chemistry and Biochemistry, University of Lethbridge

Sustainable chemical processes are crucial for society's attempts to tackle global challenges associated with climate change and chemical waste. For example, the Haber-Bosch process, a century-old method of generating ammonia for crop fertilization, accounts for a staggering 2% of the world's energy consumption and >1% of annual carbon dioxide emissions.[1] Furthermore, many routes to fine chemicals are inefficient and produce large quantities of chemical waste. Commercially significant catalytic transformations typically utilize precious metals due to high activities and the availability of various commercial and/or readily synthesized starting materials.[2] In addition, complexes of such metals react readily with small molecules by well-established processes. However, precious metals have significant drawbacks, including high toxicity, cost, and negative environmental impact.[2] In contrast, cobalt is more earth-abundant, substantially less expensive, and more biologically tolerated.[2] Previously, the Hayes group developed synthetic protocols for generating thermally stable, monoanionic pyrrole-based pincer ligands, L (L = 2,5-[^{i}Pr2P=N(4-^{i}PrC6H4)]2N(C4H2)– and ^{pym}L (^{pym}L = 2,5-[^{i}Pr2P=N(pym)]2N(C4H2) –, pym = pyrimidine),[3] as well as corresponding metal complexes thereof. One such complex, LRh(CO), readily dehydrogenates silanes[4] and boranes,[5] providing new routes to synthesize value-added chemicals.[6] The presented work describes the synthesis and characterization of cobalt complexes of L and ^{pym}L.

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Effects of Teachers' Strike on Adolescent Executive Function and Social-Emotional Competencies: Examining the Aftermath of the 2025 Alberta Teachers' Strike in a Grade 8 Population in Lethbridge, Alberta

M.K. Wood, M-L. Gregoire, J.S.L. Oldfield, R. Gibb

Research tells us that school environments that are both highly structured and highly supportive produce students with better social-emotional health (encompassing skills like emotional regulation, self-efficacy, self-esteem, emotional awareness, self-control etc.; Schoon, 2021; Wong et al., 2021). Further, adolescence is an important period of development between the ages of 10 to 24 where increases in plasticity in the prefrontal cortex refine circuits established in early childhood and lead to the emergence of executive functions (EF), which are closely related to social-emotional competencies (SEC; Center on the Developing Child at Harvard University, 2011; Gee & Casey, 2015; Riggs et al., 2006; Sawyer et al., 2018). The Alberta Teachers' Association (ATA) describes the 2025 strike as a response to growing class sizes, complex student needs, and suffering learning environments (Clement, 2025). The aim of this study is to measure changes to EF and SEC in adolescents experiencing an unanticipated break in their schooling environment (considered by the ATA to be lacking support). We hypothesize that the break in schooling will lead to changes in adolescent EF and SEC. The participants (n= 46) represent a random sample of Grade 8 students from a middle school in Lethbridge, Alberta. To measure EF, we used the Backwards Digit Span, and the National Institute of Health (NIH) Toolbox items of Dimensional Change Card Sort and Flanker Inhibitory Task. To measure SEC, we used the Rosenberg Self-Esteem Scale, the Emotional Regulation Questionnaire for Children and Adolescents, the NIH Toolbox emotional support, self-efficacy, and stress construct surveys, and an activities questionnaire. The pre-testing used in this study was developed for a concurrent research project in the Gibb Lab, while the post-testing was initiated and developed in response to the teachers' strike. We anticipate that both EF and SEC will show significant changes during the 4 weeks between pre- and post-testing that spanned the ATA strike in October 2025. Findings can be used to discuss implications for the current state of education in the province of Alberta.

Guard Your Heart: Lived Experiences of Sexual Shame, Coping, and Healing After Purity Culture

Isabella Yip, MEd Counselling Psychology

Purity culture is a religious rhetoric founded in Evangelical Christianity with strong beliefs in abstinence, regarding any sexual activity that deviates from heterosexual marriage as morally wrong or sinful. Such rhetoric has been found to strongly predict sexual shame, correlated with an array of subsequent physiological, psychological, and societal issues. Previous research has found that purity culture upholds rape and domestic violence myths, contributes to sexual dysfunction, and perpetuates racism and fetishization of people of colour. Despite previous research exploring reducing general internalized shame through self-compassion, existing literature has yet to focus on healing from purity culture sexual shame. Thus, through a qualitative study, this study aims to explore how individuals who have encountered purity culture understand, challenge, and transform their experience of sexual shame. That is, this study will explore what practices, relationships, or contexts have supported the healing, coping, or reconstruction of participants' sexuality. This study builds upon previous research suggesting the harms of purity culture, and will emphasize what avenues of healing from sexual shame have been most effective. By exploring healing from purity culture, this study aims to provide a framework for continuing research on healing from purity culture and sexual shame; destigmatize sexual wellbeing and brings issues of race, gender, and sexual orientation to the forefront; suggest content for psychologists working with affected individuals; and suggest how those who promote abstinence can do so with regard to holistic wellbeing.

An Exhaustive Search for Unbiased Skew-Type Hadamard Matrices of Order 36

Vlad Zaitsev and Hadi Kharaghani

Hadamard matrices are orthogonal ±1 matrices that play an important role in combinatorial design and quantum information theory. While the classification of Hadamard matrices becomes exponentially complex as the order increases, recent work has identified at least 157,132 SH-inequivalent skew-type Hadamard matrices of order 36. This research presents an exhaustive computational search to identify which of these matrices possessed an unbiased mate, and as a byproduct also shows that every skew-type Hadamard matrix of order 36 is equivalent to a regular Hadamard matrix.

Our methodology involves analyzing the nullspace modulo 3 to identify regularizing vectors for each candidate. Using the regularizing vectors, we constructed a graph where vertices represent vectors having an inner product of ± 6 with the matrix rows, and edges represent orthogonality. Applying a clique finding algorithm to find sets of 36 mutually orthogonal vectors to form unbiased mates, the search revealed that among the 157,132 candidates, only two matrices possessed a single unbiased mate. These findings provide new mutually unbiased bases with additional skew structure and provide a method of generating infinite families of symmetric designs.

ORAL PRESENTATION ABSTRACTS

SATURDAY

(Pages 64 – 108)

Investigating the pre-mortem diagnostic potential of neurofilament light chain in bovine spongiform encephalopathy

Lena Dabbas, Department of Biological Science, University of Lethbridge, Lethbridge, AB, Canada.

Transmissible spongiform encephalopathies (TSEs) are neurodegenerative diseases marked by neuronal loss and the buildup of abnormal scrapie prion protein (PrPSc) in the brain. TSEs affect both humans and animals, with bovine spongiform encephalopathy (BSE) being a notable zoonotic disease. BSE can be classified into classical (C-BSE) and atypical forms (H-BSE and L-BSE), with current diagnosis solely dependent on post-mortem detection of PrPSc in the brain stem. The absence of pre-mortem diagnostic tools presents challenges, including economic losses and contamination risks in human food and animal feed. Diagnosing BSE in live animals is difficult because the pathological agent, PrPSc, is mainly concentrated in the central nervous system (CNS), and infected animals might not exhibit clinical signs until late stages, complicating early detection. Given these limitations, it is paramount to explore the potential for BSE detection in live cattle, with surrogate biomarkers being the most promising approach. An ideal biomarker should be easily detectable in live subjects using a less invasive method, such as blood sampling. In this context, neurofilament light (NfL), a protein biomarker, is well documented in the literature and has been successfully identified in both the cerebrospinal fluid (CSF) and blood in cases of scrapie and CJD.

This project investigates the potential of the Neurofilament light chain protein (NfL) as a biomarker for pre-mortem diagnosis of BSE. NfL, a structural protein released from the brain into body fluids due to neuronal damage, offers a less invasive diagnostic alternative in live animals. The study evaluates how NfL levels correlate with prion protein aggregation in the brain using immunohistochemistry and compares them with NfL levels in the CSF and blood of BSE-infected cattle and controls, which are measured by ELISA. Results indicate that NfL is a promising pre-mortem biomarker for BSE and can successfully distinguish between negative and positive cases.

I Am a Cyborg: Distributed Identity in Generative Media Arts

Chelsea White, BFA

My research creation project investigates how generative artificial intelligence (genAI) reshapes identity, authorship, and agency in contemporary video arts practice. While discourse surrounding genAI often focuses on legal or economic implications (copyright, job displacement, environmental impacts), it lacks insight into the qualitative, embodied experience of human-AI entanglement, and its potential for affirmative and transformative work. Grounded within a post humanist framework, the inquiry challenges anthropocentric mastery over creativity by positioning the artist as a cyborg - a hybrid entity whose identity and agency are co-constituted through technical entanglement.

The project is treating artistic practice as knowledge production, through the creation of an experimental video featuring a synthetic actor. The methodology is utilizing a hybrid workflow blending live-action footage with generative tools for identity-swapping, motion-tracking, and style manipulation to co-construct footage that exists between physical reality and latent space. Early experimentation was marked by personal resistance to this co-constitution. Initially, I positioned genAI as a distinct collaborator to 'protect' my human authorship; however, this approach was confronted by the friction of my perfectionism and the unpredictable, fluid nature of the technology. Through a multi-modal reflection process including video logs, written journals, and audio recordings, I am actively tracking how hardware limitations, as well as unexpected generative outcomes, actively shape the work and identity of the artist. As a result of this process, the project embraces a model of distributed agency. The work emerges not from a human center, but instead a distributed and entangled hybrid where the boundary between 'me' and 'machine' is intentionally blurred. Ultimately, the inquiry frames human-AI entanglement as a site of transformation, embracing a fluid posthuman self that confronts the illusion of the static self in favour of a distributed identity.

Colonial Intersectionality as Stabilizer of Extractive Flows

Shara Merrill

This presentation offers a new way of understanding colonial intersectionality by treating social identities as components of a dynamic flow structure that sustains extraction. Rather than approaching race, gender, sexuality, religion, and class primarily as symbolic or representational categories, I argue that each identity formation performs distinct stabilizing work that makes extractive systems more efficient, predictable, and self-maintaining.

The presentation begins by modeling colonial extraction as a set of material and energetic flows - labor, care, reproduction, motivation, behavior, and accumulation - that must be made reliable over time. I then show how identity categories emerge as solutions to specific stabilization problems within these flows. Race stabilizes labor by sorting and disciplining workforces; gender stabilizes unpaid care and biological reproduction; sexuality policing stabilizes behavioral norms and social predictability; religion stabilizes motivation and internalized discipline; and class stabilizes distribution, accumulation, and legitimacy.

My original contribution is to demonstrate that these identities do not merely “intersect” in a descriptive sense, but function together as an interlocking system that reduces entropy and minimizes the need for overt coercion. When combined, they form a low-cost engine of extraction that reproduces itself through everyday social life rather than constant force.
The presentation uses a visual structure that first presents extractive flows on their own, then progressively reveals the identity formations that stabilize each one. This makes visible how different identities do different kinds of work, while also showing how they reinforce one another. By reframing intersectionality in terms of functional stabilization, this project advances postcolonial and critical race theory by offering a causal, system-level explanation for the durability and adaptability of colonial power structures.

Indigenous Music Instruction With Youth

Angela Brooks

This is a sharing from six Indigenous musicians about their own musical journeys and how they would ideally like to see youth learn musics going forward. Three Cree musicians and three Blackfoot musicians share their personal experiences, their cautions, and their hopes for how musics can be instructed with youth. An approach of excellence is expressed in different ways by each musician. This means a focus on preparing oneself before, during, and after musicking instead of focusing on mastery or perfection of a particular song or instrument for one performance. Prominent learnings that came from the visits with these musicians are the importance of relationality, experiential learning, and choice. Intertwined within the musicians' sharings are also stories about deceit, disrespect, elitism, and jealousies. These musicians have learned musics from family, from classical music instructors, from schoolteachers, and from Elders. They have each chosen to instruct youth in musics in various ways including—but not limited to—within Ceremony, within school or community settings, within their work, and within their own homes. This thesis shares their recommendations and points to next steps. Above all, the most important sharing that every musician expressed was the role of respect in both learning and instructing of musics, and that music learning begins before birth and carries on after death. They share that musics are kin and need to be cared for as family; this is our sacred responsibility.

Investigating Microcystin Contamination in Alberta's Irrigation District: Impacts on Soil, Crops, and Water Quality

Mia Lahiji[1,2], Tara Vucurevich[1], Tara Shelton[1], Ilakkiya Thirugnanasambandam[1], Tabitha Gangur-Powell[1], Jonathan Challis[1]

[1]Agriculture and Agri-Food Canada, Lethbridge Research and Development Centre, Lethbridge AB, Canada
[2]University of Lethbridge, Lethbridge AB, Canada

Microcystins (MCs), potent hepatotoxins produced by cyanobacteria, pose significant threats to environmental and human health due to their widespread occurrence in aquatic ecosystems. Concerns regarding cyanobacteria and their related toxins are rapidly growing as eutrophication and climate change continue to promote their proliferation. These toxins can accumulate in plants and soils, raising concerns about their potential impacts on terrestrial ecosystems and human exposure, including through the consumption of food crops irrigated with MC-contaminated water. Alberta's nutrient-rich lakes and reservoirs are particularly susceptible to harmful algal blooms, yet MC contamination in irrigation water remains poorly understood. This study seeks to characterize contamination of MC-LR, MC-RR, and MC-YR within Alberta's irrigation district, as well as their potential bioaccumulation in crops and soils through MC-contaminated irrigation water. Water samples were collected from sites across Alberta's irrigations districts during the 2024 and 2025 growing season. MC concentrations were generally low, with only 3% of samples exceeding 1.0 µg/L, and 1% exceeding 10 µg/L in both years. An optimized MC method for plant and soil matrices using HPLC-MS/MS was then applied to barley samples from a controlled greenhouse experiment which were irrigated with MC-amended water at concentrations of 0, 0.1, 1.0, and 10 µg/L over a 90 day period. No effect on barley plant health nor MC bioaccumulation in the plant tissue was observed. Soil analysis demonstrated a steady decline in MC mass balance over time, suggesting potential MC degradation. This data improves our understanding of the risks harmful algal blooms may pose to soil, crop, and consumer health.

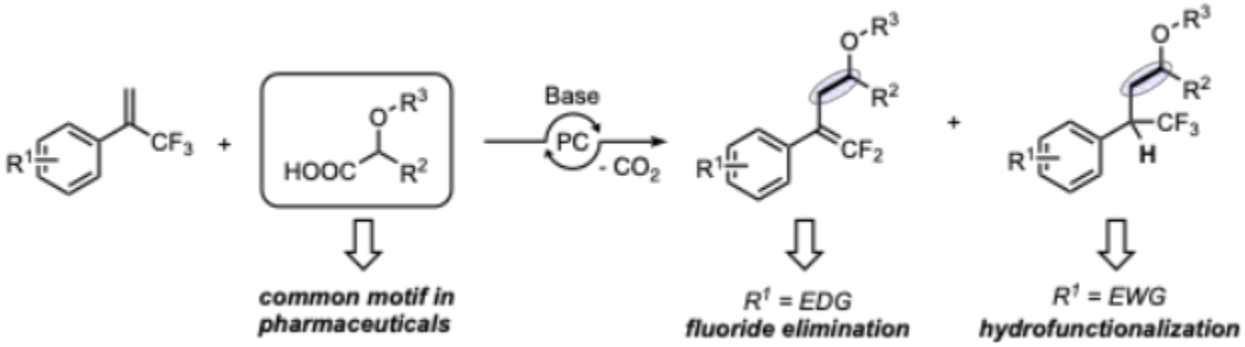
Organophotocatalyzed Installation of gem-Difluoroalkene and Trifluoromethyl Groups onto Pharmaceutical Building Blocks.

Taylor Semeniuk[a] and Jean-Denys Hamel[a]*

[a]Canadian Centre for Research in Advanced Fluorine Technologies, University of Lethbridge, 4401 University Drive West, Lethbridge, Alberta, Canada

Organofluorine chemistry involves the study of organic compounds that contain one or more fluorine atoms. The carbon-fluorine bond has unique properties that manipulate the molecules' overall properties, making it a powerful tool for pharmaceutical development. Specifically, the *gem*-difluoroalkene motif is utilized as a stable bioisostere for metabolically unstable carbonyl groups. With a lack of these motifs existing in nature, installation of these groups onto biologically relevant molecules must be done synthetically. Recently, our group has developed organophotocatalyzed reactions that convert allylic difluorides to monofluoroalkenes using anilines, a-amino acids and 2-oxoacids as substrates. An unexplored class of substrates is the a-oxyacetic acid motif, which is a common functional group in various pharmaceuticals and organic building blocks.

With this in mind, we successfully discovered a C–C coupling reaction between α-(trifluoromethyl)styrenes and a-oxyacetic acids, resulting in *gem*-difluoroalkenes. This reaction is catalyzed by an organic photocatalyst, which demands mild, metal-free conditions and aligns with the principles of green chemistry. The photocatalyst enables radical decarboxylation of the acid, resulting in a new carbon-centered radical that couples to the a-(trifluoromethyl)styrene The resulting anion undergoes fluoride elimination to yield a *gem*-difluoroalkene motif. This reaction has shown success when performed on different pharmaceuticals and organic building blocks that contain the a-oxyacetic acid motif, showing potential for late-stage functionalization. Furthermore, we found that a-(trifluoromethyl)styrenes bearing electron-withdrawing groups can stabilize the intermediate carbanion, resulting in the selective formation of the hydrofunctionalization product that instead contains a trifluoromethyl group. This substrate-dependent C–C coupling reaction unlocks the potential to selectively produce either *gem*-difluoroalkene or trifluoromethyl motifs by simply changing the electronics of the aromatic ring.



Evaluating the impact of multiple stressors on plant communities after wildfire

Genoa Alger[1] and Jenny McCune[1]
[1]Department of Biological Sciences, University of Lethbridge, Lethbridge, AB, Canada

Wildfire is a typical disturbance in the Canadian Rocky Mountains; however, stressors such as climate change, human disturbance and increased fire intensity could affect how plant communities respond to fire. Warmer temperatures favour heat adapted species, human disturbance spreads exotic species, and large fires mean that the centre of the burn may lack seed sources. Each of these stressors could result in altered plant communities by changing which species regrow and where they establish.

In 2017, a wildfire burned 38.6% of Waterton Lakes National Park (WLNP). In 2024/25 we remeasured vegetation plots which were initially measured in 1994/95 and revisited in 2019/20. These plots include both burned and unburned sites, enabling us to compare post-fire community shifts with unburned communities. To determine the successional trajectory, or whether plant communities are returning to a pre-fire state, we calculated the change in plant community composition between visits of each plot. We then modeled how successional trajectory is affected by temperature (i.e. aspect), human disturbance (i.e. trails), distance from burn edge, and other environmental predictors.

The best model found increased likelihood of altered trajectories on south facing aspects, consistent with our hypothesis on warming temperatures. Distance to trails and burn edge were not important predictors. In unburned areas, higher elevations displayed increased altered trajectories. However, in burned areas lower elevations were more likely to have altered trajectories. In unburned areas, plots with deeper soils displayed increased altered trajectories, whereas in burned areas, the effect of soil depth was weaker and opposite.

In WLNP, shifts away from pre-fire plant community composition were influenced more by climate, topography and soil depth than human disturbance or fire patterns. Managers should pay attention to the impacts of warming, which may result in altered communities even in the absence of wildfire.

AI as a New Dominating Force: Linguistic Homogenization and the Erosion of Bangladeshi English

A K M Iftekhar Khalid

Artificial intelligence (AI), because of its structural dependence on US English, poses a new, powerful threat of linguistic, technological, historical, ideological, and cultural homogenization. Although both AI and colonialism share a power dynamic of dominance and extraction, AI contradicts and suppresses a hybridity that was characteristic of relationships between colonizer and colonized in previous centuries. The paper thus examines the views of colonial, postcolonial, and AI theorists on colonial power, hybridity, culture, and hegemony, and explains how AI dominance can homogenize language and culture in South Asia and across the Global South. Over more than two hundred and fifty years, the people of Bangladesh have established a balanced, decolonial relationship between English and Bangla, a situation most memorably described by Nobel Prize-winning Bangla author Rabindranath Tagore as the intersection of the country's two great rivers, the Ganges and the Jamuna. While Tagore's metaphor captures the interactive hybridity of colonial linguistic exchange, AI resembles something very different, operating more like the Mississippi. AI is built on algorithmic frameworks that absorb data globally and homogenize it into a single linguistic variety, as the Mississippi carries everything toward a single dominant stream. For understanding the new hegemony of AI, it presents two conceptual tools. The first, Kulturraum, a geographical and social space with a shared set of cultural practices and values, reveals how hybridity creates an established mixed culture, such as Bangladeshi English (BdE). The second—the Company Town, which refers to a corporate entity that dominates a community—explains the convergent, non-negotiable logic of corporate technology design. While AI technology reproduces colonial patterns, it erases the established hybrid culture that emerged from colonial interaction. The paper concludes that this non-interactive singularity of AI threatens to extinguish hybridity and poses an existential risk to the cultural dynamism of postcolonial societies like Bangladesh.

Keywords: Hybridity, Linguistic hegemony, Homogenization, Kulturraum, Company Town

The Investigation and Characterization of RMRP Interactions with Human Proteins

K. Liland, H. Sette Pereira, L. Kerr, T. Patel

Department of Chemistry and Biochemistry, University of Lethbridge, Department of Microbiology, Immunology and Infectious Disease, Cumming School of Medicine, Li Ka Shing Institute of Virology and Discovery Lab, University of Lethbridge

The RNA component of Mitochondrial RNA Processing Endoribonuclease, or *RMRP*, is a long non-coding RNA that has roles in mitochondrial DNA replication regulation and RNA processing to ensure optimal mitochondrial function and maintenance through cleaving mitochondrial RNA. All the functions of *RMRP* have yet to be discovered as it remains an area of active research in disease pathogenesis and cellular physiology. Recurrent mutations in the *RMRP* promotor region have been shown to increase the expression and progression of cancer by enhancing glycolytic activity and cell proliferation, supporting the growth and survival of cancerous tumours. *RMRP's* interaction with proteins may contribute to regulating cellular processes and maintaining activity and stability. Understanding these interactions will provide insights into molecular mechanisms underlying mitochondrial disease and cancer cell proliferation. This study aims to understand and biophysically characterize the interactions between *RMRP,* and human proteins identified via pulldown assay. Investigating the interactions involved in the cellular processes of transportation to the mitochondria, pre-mRNA splicing, DNA repair, and the mediation of linkages, will map the complicated interactions of *RMRP's* molecular network. Expanding on these interactions will provide molecular mechanistic insights into *RMRP's* role, its modulation by host factors, and its broader implications in cellular processes and disease progression.

Trails, wildfire and botany: Exploring how trails and wildfire influence the spread of invasive species in Waterton Lakes National Park

Heather Davis

National Parks are experiencing increased visitation and more severe wildfires, yet it is unknown how these combined impacts influence plant communities. For example, recreational trails are corridors for seed dispersal, and may facilitate an increased abundance of exotic species following wildfire. We surveyed 70 transects along trails and 14 off-trail transects in Waterton Lakes National Park, in unburned areas and areas burned in the 2017 Kenow Wildfire. We tested the effect of trails and wildfire on the presence and the relative abundance of exotic species. We found exotic species declined with elevation; however, at median elevations low and medium-use trails had a higher probability of finding exotic species. While not significant, burned areas had a higher presence of exotic species. We found in grasslands and mixed forests a higher probability of exotic species existed compared to coniferous forests, but only mixed forests were significantly higher than coniferous forests. However, grasslands in burned areas had more than double the relative abundance of exotics compared to unburned areas. We then measured the zone of influence extended out from the trail and estimated the total area influenced by both formal and informal trails throughout Waterton.

Perspectives of Canadian older adults on life satisfaction: a qualitative study

Authors:

Chiedozie James Alumona[1], Laura Vogelsang[1], Adesola C. Odole[2], Jerome Singleton[3], Oluwagbohunmi Adetunji Awosoga[1]

Affiliations:

[1] Faculty of Health Sciences, University of Lethbridge, Lethbridge, Alberta, Canada
[2] Department of Physiotherapy, Faculty of Clinical Sciences, College of Medicine, University of Ibadan, Ibadan, Oyo, Nigeria
[3] School of Health and Human Performance, Faculty of Health, Dalhousie University, Halifax, Nova Scotia, Canada

Life satisfaction is a key indicator of healthy ageing and well-being. We explored the meanings and experiences of life satisfaction among Canadian older adults.

Using a phenomenological design, we recruited 15 community-dwelling older adults aged 65 years and older living in Lethbridge, Southern Alberta, and interviewed them about their meanings and experiences of life satisfaction. The interviews were transcribed and analysed using a reflexive thematic analysis.

Seven themes emerged, indicating that the life satisfaction of Canadian older adults is shaped by the interplay of health, material security, social connectedness, purposeful contribution, faith and spirituality, access to the outdoors, and exploration and cognitive engagement. Participants described functional health as a prerequisite for life satisfaction, alongside adaptive strategies in response to age-related decline. Material security, particularly financial sufficiency and comfortable housing, reduced anxiety and prevented experiences of struggle. Social connectedness rooted in family, friendships, and community participation fostered feelings of recognition and belonging, while purposeful contribution through helping others and volunteering generated reciprocal satisfaction. Faith and spirituality provided existential meaning and a coping resource for navigating loss and adversity. Access to nature and community spaces centres supported relaxation and emotional well-being, while life satisfaction was further sustained through exploration and cognitive engagement, including travel, reading, and learning, which fostered curiosity in later life.

The findings highlight actionable pathways to enhance life satisfaction, including promoting healthy living, strengthening income and housing security, expanding opportunities for social connection, integrating spiritual resources into practice, fostering age-friendly environments, and supporting lifelong learning.

Keywords: Well-being, Healthy ageing, Quality of life, Successful ageing, Geronology

The Fogo Process: Participatory Documentary as Collaborative Practice

Derek Novosad

During an era of emerging audiovisual technologies that enabled new approaches to nonfiction filmmaking, the National Film Board of Canada (NFB) initiated the Challenge for Change program (CFC, 1967–1980). Designed to use film as a tool for social education and change, aspects of the CFC demonstrated some newfound and radically participatory methods intended to democratize media production, amplify marginalized voices, and address pressing social issues.

My research examines Colin Low's Fogo Island Project (1967–68), a cornerstone of the CFC program, as a formative experiment in participatory documentary. I analyze how the Fogo films' formal innovations, especially their "vertical editing" structure and integrated feedback loops, operated as collaborative, community-engaged practices; these practices effectively mediated dialogue between isolated island factions unto themselves, and with state institutions beyond that. I argue that the Fogo Process modeled a dynamic, relational approach to nonfiction filmmaking, one that prioritized process over product and reconfigured social relations and social imaginaries through iterative, localized production and screening practices. Ultimately, I contend that the Fogo Project prefigured key logics of contemporary activist media. It offers enduring insights into how participatory documentary can actively reshape collective memory, reconstitute/reimagine political agency, and strategically support community mobilization to enact material change, even from within the constraints of a state-sponsored framework.

Finding the right site: Using species distribution and community-based models to predict rare plant translocation success

Emma R. Neigel[1], D. Ryan Norris[2], J.L. McCune[1]

[1] *Department of Biological Sciences*, *University of Lethbridge, 4401 University Drive, Lethbridge, Alberta T1K 3M4*

[2] *Department of Integrative Biology, University of Guelph, 50 Stone Road East, Guelph, Ontario, Canada, N1G 2W1*

Conservation translocations can be a valuable tool for species recovery but often fail due to an inability to identify suitable habitat, as sites are commonly selected based on expert opinion rather than quantitative approaches. We tested the ability of species distribution models (SDMs) and community-based models (CBMs) to predict translocation outcomes of two rare plant species —the wood-poppy (*Stylophorum diphyllum*) and the crooked stem aster (*Symphyotrichum prenanthoides*)— over three years. SDMs estimate habitat suitability based on broad-scale environmental variables while CBMs quantify the similarity of plant communities at translocation sites to those at wild sites. We planted each species into sites with varying SDM-predicted habitat suitability, measured plant community composition, and controlled for the effects of transplant characteristics (planting size class, seed source), microsite conditions (soil moisture, canopy cover), and biotic interactions (herbivores or competition). Transplant characteristics and microsite conditions were the strongest predictors of early success, rather than SDM- and CBM-predicted habitat suitability. The habitat suitability estimated by the CBMs interacted with microsite variables to influence survival of both species and was independently positively associated with one species flowering. The habitat suitability estimated by the SDM interacted with microsite variables to influence one species flowering and was independently positively associated with seedling production of the other species. The low efficacy of the habitat suitability models to predict early translocation success likely reflects their coarse spatial resolution and emphasis on long-term environmental processes, suggesting long-term monitoring is needed to evaluate if these estimates can predict population persistence.

Understanding the Death of Love: Conceptual Metaphors in Taylor Swift's The Tortured Poets Department: The Anthology

Jocelyn McKnight, BA Student in English, University of Lethbridge

This paper presents a cognitive linguistics study on the conceptual metaphors present in Taylor Swift's 11th studio album, *The Tortured Poets Department: The Anthology (TTPDTA)*. This album is the extended version of *The Tortured Poets Department (TTPD)* and contains 15 tracks in addition to the original release. For this study, 26 of the 31 songs from *TTPDTA* have been taken as a corpus to analyse the conceptual metaphors for romantic love used across the album. Metaphor Identification Procedure (MIP) is the primary qualitative methodology used, as it has been successful in previous studies of conceptual metaphor analysis for songs. This method consists of initial close reading, lexical unit identification, and contextual vs. basic meanings identification. Building off Lakoff and Johnson's conceptual metaphor theory, this paper identifies key structural metaphors for love and relationships. The results suggest love is predominantly constructed through seven main metaphors (e.g., LOVE IS PAIN, LOVE IS PRISON, LOVE IS RELIGION, LOVE IS A JOURNEY, LOVE IS A LIVING ORGANISM, LOVE IS PERFORMANCE, LOVE IS GAME). This indicates that there is a small subset of recurring metaphors, all with stable entailments, that structure the way love and relationships are talked about and understood in this album, meaning they function as an album-level framing device. This paper contributes to the study of conceptual metaphors in music and the growing body of literature on metaphorical analysis in Taylor Swift songs, while laying the basis for future diachronic comparison of metaphors across Swift's discography.

Effects of Forest Fires on Population Structure of the Black-capped Chickadee *Poecile atricapillus*

Nikeet Pradhan[1] and Theresa M. Burg[1]
[1]Department of Biological Sciences, University of Lethbridge, Lethbridge, Alberta, Canada

Climate change has intensified environmental disturbances, such as forest fires, causing massive habitat loss, habitat fragmentation, and an increased risk of species extinction. Studies on the effects of forest fires have shown reduced diversity and richness; however, few have investigated the impact of fires on genetic diversity in birds. Forest fires fragment forests, impeding dispersal pathways, reducing gene flow and genetic diversity while increasing inbreeding in resident forest birds. This has the potential to influence fitness, adaptation, and populations in the long term. This project focuses on how the effects of forest fires influence the population structure of the Black-capped Chickadee, a resident forest species, using genome analysis. The study will be conducted in Southern Alberta and Central British Columbia, where each area has experienced wildfires in the last decade, and population structure has been detected. Samples will be collected from eleven sites using a transect-based sampling approach, with sampling limited to a 10 km radius around each site. Moreover, samples from our previous lab work will also be used to compare genetic diversity in pre- and post-fires, collected from locations close to the same sampling areas before the wildfires. This study will provide a better understanding of how forest fire-induced habitat fragmentation impacts population connectivity and help with post-fire restoration, conservation planning, and biodiversity management.

Evaluating the effects of urban development on population genetic structure in Black-capped Chickadees (Poecile atricapillus)

Tregellas Madeira, L. R.[1], Burg, T.M.[1]
[1]Department of Biological Sciences, University of Lethbridge, 4401 University Drive, Lethbridge, Alberta T1K 3M4

Understanding how individuals interact and move across the landscape is important for species' management and conservation. Environmental factors and landscape features can shape an organism's movement and understanding how these influences affect genetic structure is crucial for conservation purposes. Natural barriers can restrict an individual's movement and may decrease connectivity between groups. In the last century, the rate of urbanization has increased the complexity of species' movement. Some urban environments may be too challenging for a species to cross, creating isolated populations in pockets of suitable urban habitats leading to genetic differentiation. Recent advancements in genetics allow us to collect information at unprecedent scales to explain how populations interact and differ from one another. My research will investigate the effects of urbanization on the population structure of Black-capped Chickadees. I will use species distribution models to identify suitable habitat in three Albertan cities (Edmonton, Calgary, and Lethbridge), then collect blood samples from individuals to sequence their DNA. This information will be used to investigate if individuals from different parts of the city are isolated from each other and if features such as green spaces connect populations. Avian species are important indicators of biodiversity; they provide ecosystem services and enhance human well-being. If urban landscape processes are having an impact on their abundance and connectivity, other species might be experiencing the same type of pressure. Understanding how genetic diversity works and changes in an urban setting can help us design strategies that enhance the biodiversity of cities, especially for sensitive and elusive species.

Pain and Suffering: What Do They Mean?

Emily Lewis

This research is currently in progress (data collection began in January 2026).

Chronic pain is a common problem, yet pain and pain-related suffering are poorly defined and often conflated with one another. This can be confusing and difficult when trying to explain the experience of chronic pain to others such as health care providers and raises the question of whether practitioner and patient mean the same thing when talking about pain and suffering. Chronic pain is often treated through the medical system which tends to favour biomedical explanations of pain and could potentially neglect or under-treat suffering. Additionally, there is no consensus definition of pain or pain-related suffering which makes it difficult to assess and treat these afflictions. This hermeneutic phenomenological study will explore how Canadians with chronic pain understand and experience pain and pain-related suffering based on their lived experience.

How Mapudungun is taught online

Daniela McGonigal-Plankey

Keywords: Mapudungun; YouTube; thematic analysis; cultural models; connectivist theory

My thesis examines how Mapudungun is taught online, and how online platforms can effectively be used by a wider, global audience to learn an Indigenous language like Mapudungun. Data will be collected through the qualitative research method of Thematic Analysis with the objective of examining how Mapudungun is taught online. The significance of this research lies in the importance of Indigenous language maintenance in Latin America, and future efforts in revitalization efforts using a digital technology like YouTube.

Early results have shown an intent to bring Mapudungun to a wider, global audience, while focusing on Chile and Argentina. There is a relatability among young white Hispanic Chileans through the presence of a Hispanic Chilean learner, along with the cognitive model of "transfer error" and the assumptions held by the instructors that Spanish speakers inherently know English as a reference and have an established knowledge of English while viewing the videos. I examine the idea of exposure to a second language being taught in schools in Chile because of growing globalization and a push to learn English around the world. Another important aspect of my research is the idea of Connectivist theory, and the network of connections people create through the comments sections on the YouTube videos I am analysing. Is there a connection that can be created between language learners and engagement with Mapudungun through people's public YouTube comments? This will shed further light on how an Indigenous language can be taught in the age of technology.

Angelic Devil's Advocacy: Reengineering Debate Incentives to Cultivate Open-Mindedness Under Polarization

Nathan Fuehrer

Democratic societies increasingly exhibit group polarization, in which deliberation among like-minded individuals intensifies rather than moderates disagreement. Although critical thinking is widely promoted as a democratic competency, persistent polarization suggests that the primary failure is motivational rather than cognitive. Open-mindedness—understood as a risk-bearing epistemic virtue—often carries reputational and social costs under polarized conditions and is therefore least likely to be exercised when most needed. This paper argues that cultivating open-mindedness requires redesigning argumentative incentives under conditions of contest, rather than relying on exhortation, sincerity, or appeals to consensus.

The paper compares inquisitorial debate formats, which emphasize cooperative inquiry, with traditional adversarial formats, which motivate engagement through competition. It argues that inquisitorial models often lack epistemic pressure, permitting revision without consequence, while adversarial models misdirect pressure toward verdict defense, strategic insincerity, and identity-protective reasoning. These failures stem from treating competition and cooperativity as opposed rather than orthogonal design variables.

Building on Stevens and Cohen's (2021) notion of the Angelic Devil's Advocate, the paper introduces Angelic Devil's Advocacy (ADA) as a pedagogical redesign of adversarial debate. ADA reconceives advocacy as epistemic role-performance governed by enacted charity and functional insincerity, insulating evaluation from personal belief, moral alignment, and group identity while preserving competitive pressure. Under ADA, success systematically rewards justificatory responsibility, principled concession, and disciplined engagement with alternative inferential frameworks, including socially disfavored positions.

The paper applies ADA to polarized knowledge environments, arguing that stigma-based dismissal functions as epistemic closure by substituting exclusion for adversarial testing. ADA reopens inquiry by requiring even widely rejected views to be defeated through full justificatory exposure rather than dismissal. The paper concludes by addressing feasibility concerns, defending ADA as a classroom-oriented pedagogical model whose judging norms can be refined and routinized over time.

Performance Impacts of Work Gloves are not Mitigated by Physical Literacy, Hand Anthropometrics, or Manual Work Exposure

Dean Stewart[1,2], Abby Stonehocker[1], Olu Awosoga[2], Hardeep Ryait[3], Jon Doan[1,2]

[1]Engineering and Human Performance Lab, Department of Kinesiology and Physical Education, University of Lethbridge; [2]Faculty of Health Sciences, University of Lethbridge; [3]Department of Neuroscience, University of Lethbridge

Personal protective equipment (PPE) is prescribed in many occupational environments but may constrain motor performance. Physical literacy (PL), reflecting movement competence, confidence, and physical capacity, has been proposed as a factor that may enable individuals to better adapt to task constraints. However, it remains unclear whether PL or other individual characteristics mitigate PPE-related impairments in fine and gross motor performance. This study examined whether physical literacy, hand anthropometrics, or manual work exposure modify the effect of gloves on grip strength and fine motor dexterity.

Thirty-eight adults (25.7 ± 7.2 years) completed grip strength and Purdue Pegboard Test (PPT) assessments under gloved and ungloved conditions in a randomized within-participant design. Grip strength was measured using a hand dynamometer, and fine motor performance was assessed using the PPT. PL was assessed using the PLAYcoach questionnaire and grouped post hoc (low, middle-50, high). Hand anthropometrics were grouped by hand breadth size (small, middle, large), and participants were categorized by manual work exposure (manual vs non-manual). Performance change scores (gloved − ungloved) were calculated for each outcome and compared across groups to evaluate moderation.

Glove use significantly reduced performance, with grip strength decreasing from 38.7 ± 1.7 Kg ungloved to 32.5 ± 1.4 Kg gloved, and cumulative PPT performance declining from 39.4 ± 0.9 to 14.3 ± 0.6. Glove-related changes in grip strength and PPT performance were comparable across PL groups, hand size groups, and manual work exposure categories. Manual work exposure did not attenuate grip strength impairment (manual: 7.0 ± 6.5; non-manual: 5.5 ± 4.4; $p = 0.43$).

Gloves impose substantial performance constraints that are not mitigated by physical literacy, hand size, or manual work exposure, suggesting glove-related impairment is primarily an equipment-level issue rather than a worker-dependent one.

The Bilingual Brain: Language Experience and Executive Function in Preschoolers

Sally Sade[1], Claudia Gonzalez[1], Robbin Gibb[1]
[1]Department of Neuroscience, University of Lethbridge, Lethbridge, AB, Canada

For over half of the global population, communication involves switching between multiple languages. Despite the prevalence of bilingualism, findings regarding its cognitive impact during early childhood have been mixed and remain a topic of ongoing debate. Historically, second language use was often framed as detrimental to intelligence; however, more recent work has shifted toward examining its positive influence on higher-order cognitive processes that regulate emotion and goal-directed behavior, collectively referred to as executive function (EF). The objective of the present study was to examine the association between second language experience and EF skills in children aged 3–5 years. Children completed a comprehensive assessment battery measuring EF, language, social competence, and motor function. EF was assessed using the Dimensional Change Card Sort, Stroop task, Flanker task, and backward digit span. Language ability was measured using the Peabody Picture Vocabulary Test, social competence through unstructured dyadic DUPLO play, and motor ability using a grasp-to-construct task. Caregivers completed questionnaires including the Language Experience and Proficiency Questionnaire (LEAP-Q), the Behavior Rating Inventory of Executive Function–Preschool Version (BRIEF-P), the Ages and Stages Questionnaire, and the Adverse Childhood Experiences questionnaire. Results showed performance-based differences on table-top measures of EF, as well as differences in social competence during dyadic DUPLO play. Caregiver-reported outcomes on the BRIEF-P indicated significantly stronger emotional control, flexibility, and inhibitory self-control among bilingual children compared to their monolingual peers. These findings suggest that bilingualism may support experience-dependent brain plasticity, extending beyond language-specific processes to broader executive function systems during early childhood.

Using Naturalistic Neuroimaging to Enhance Knowledge of Sex Differences in Memory Networks

Jane O'Connor[1], Shaylyn Kress[2], Dave Smith[3], Keva Klamer[4], Joshua Craig[5], Alireza Taheritorbati[6], Sabrina Werner[7], Rylee Wevers[8], Niayesh Allahdad[9], Chelsea Ekstrand[10]; [1]University of Lethbridge

Males and females exhibit differences in episodic memory, both behaviourally and neurally. For example, females have a general episodic memory advantage, as well as higher connectivity in the posterior default mode network (DMN) and lower connectivity in the anterior DMN compared to men. There are significant advantages to using naturalistic stimuli (such as audiovisual movies) for uncovering memory networks, however, few studies have used such stimuli to investigate network differences in delayed memory recognition between males and females. In this study, 35 older adults (age 55-75, 17 female) encoded six narrative driven, naturalistic scenes. Seven days later, all participants completed a delayed recognition task during fMRI, where they viewed three previously encoded and three novel scenes. To identify differences in functional connectivity during recognition between males and females, we used functional connectivity multivariate pattern analysis (fc-MVPA) with post-hoc seed-based connectivity (SBC) analyses. Fc-MVPA revealed four clusters where functional connectivity differed between males and females for the encoded vs. novel scenes, including the left hippocampus, ventromedial prefrontal cortex, right angular gyrus, and the right cerebellum. SBC from these ROIs showed widespread between-network differences between males and females. Notably, the left hippocampal ROI showed significantly greater connectivity for males with the DMN than for the females. These results provide evidence of unique differences between males and females in neural connectivity during episodic memory recognition, particularly between the DMN and hippocampus. More broadly, we provide valuable insight into network level sex differences in more true-to-life episodic memory conditions in older adults.

Resistance exercise transiently increases active PYY without altering energy intake over 4 days in healthy adults

Connor J Bunnage[1], Julia O. Totosy de Zepetnek[2], and Marc R. Bomhof[1]

[1]University of Lethbridge, Department of Kinesiology and Physical Education, Lethbridge, AB T1K 3M4, Canada
[2]University of Regina, Department of Kinesiology and Health Studies, Regina, SK, S4S 0A2, Canada

Resistance exercise (REx) has become an increasingly utilized strategy for weight management and the achievement of health-related goals. It may acutely reduce appetite following an exercise session through enhanced secretion of appetite-regulating hormones. Despite this acute anorectic effect, REx does not often translate to reduced energy intake. To date, the long-term effects of REx on energy intake remain unclear. This study investigated the latent effects of REx on appetite-regulating hormones and energy intake in healthy males and females. In total, 13 participants (6 females, 7 males, age = 21.8 ± 3.3 years, BMI = 25.5 ± 3.5 kg/m^2) completed the study. Participants completed two 4-day trials in a randomized crossover design: 1) intense whole-body REx (to failure: deadlift, chest press, barbell squat, military shoulder press, bent-over row, and latissimus dorsi pulldown) and 2) sedentary (SED) control. Full body REx and sedentary sessions were completed on the second and fourth days of each trial. To accurately assess energy intake throughout each trial, participants exclusively consumed a standardized liquid meal replacement beverage (Ensure® Plus). Blood samples were collected pre-, immediately post-, and one-hour post REx/SED sessions to measure appetite-regulating hormones. Lactate concentrations were elevated immediately post REx following both sessions (p<0.05). A condition x time interaction was observed (p < 0.05) for active PYY, with concentrations remaining elevated immediately post REx during both sessions, and one-hour post during the first session (day 2). No changes were observed in appetite-related hormones active GLP-1, leptin, GDF-15, or IL-6. Subjective appetite did not differ between conditions. No differences in total energy intake were observed between the REx and SED conditions. Our investigation indicates that acute REx elicits a transient increase in active PYY without altering energy intake over a 4-day period.

Sex specific changes in appetite and energy intake in response to chronic resistance training

Joshua C. Kuzminski, Jared Rollingson, and Marc R. Bomhof

University of Lethbridge, Department of Kinesiology and Physical Education, Lethbridge, AB

The energy compensation (EC) mechanisms contributing to the maintenance of body weight (BW) during chronic exercise are not fully understood. Moreover, little is known about the chronic effects of anaerobic exercise on EC and appetite. This study explored the impact of chronic resistance training (RT) between sexes on acute appetite response, chronic appetite, and compensatory energy intake (EI) in Sprague Dawley rats. Ten-week-old male and female Sprague Dawley rats were randomized into 1 of 4 groups: 1) Control male; 2) Control female; 3) Male RT; 4) Female RT (n=10 rats/group). RT groups performed 12 weeks of ladder-based RT. In week 12, all groups performed an exercise challenge test to assess the acute effects of anaerobic exercise on appetite. Tail vein blood draws were serially collected at baseline, 0, 30, 60, and 120min post-exercise. A portal vein blood draw was collected pre-euthanasia. Food intake was measured throughout the 12-week experimental period and during the 48 hours following the exercise test. Males (Time×Sex, $p<0.01$) and controls (Time×Condition, $p<0.05$) had a faster increase in bodyweight over 12-weeks with RT males displaying smaller comparative increases (Time×Condition×Sex, $p<0.01$). Acute post-exercise responses included increased acyl-ghrelin (AG) and relative 48-hour EI (kcal/kg BW) in RT groups (AG: $p<0.01$, EI: $p<0.01$) and females (AG: $p<0.001$, EI: $p<0.01$), with RT females displaying greater AG levels (Sex×Condition, $p<0.01$). Post-hoc analysis showed 48-hour EI was increased for female RT compared to control ($p<0.05$). Portal blood analyses showed no hormonal differences between groups. These results suggest that adaptations to chronic RT include an increased acute post-exercise EC through relative EI over 48-hours, which may be related to acute increases in AG. Resistance-trained females display greater EI compensatory patterns, relative to RT males. Additionally, resistance-trained males present lower BW outcomes relative to RT females, possibly due to a lower EC response.

Triggering molecular rearrangements: Discovering the useful pairing of fluorine and boron

Ty Dudas[1,2], Austin Pounder[1,2], Isabella M. Umeris[1,2], Stacey D. Wetmore[2] and Jean-Denys Hamel[1,2]*

1. Canadian Centre for Research in Advanced Fluorine Technologies, University of Lethbridge, Lethbridge, AB, Canada
2. Department of Chemistry and Biochemistry, University of Lethbridge, Lethbridge, AB, Canada

Carbon binds to fluorine stronger than any other element. In fact, it is such a strong bond that it is generally considered unreactive. However, this does not mean it cannot be broken, but it certainly comes as a surprise when it occurs unintentionally! So was the case in a new transformation that we discovered: a cascade process wherein an allylboration reaction is followed by a spontaneous defluorinative semipinacol rearrangement. On the one hand, this is particularly intriguing as semipinacol rearrangements usually require a good leaving group, which fluoride is not due to the strength of the carbon-fluorine bond. On the other hand, such skeletal rearrangements demand investigation as they are powerful tools to reorganize the carbon skeleton of organic compounds and facilitate the preparation of complex molecules. Thus, we conducted a thorough experimental study to assess the versatility of the new cascade reaction and discovered it has the most success with electron-rich aromatic aldehydes in ether solvents. In parallel, computational studies have determined that a unique interaction between fluorine and boron causes the cleavage of the carbon-fluorine bond, thus initiating the rearrangement. The results obtained up to that point fueled an ongoing follow-up study wherein we seek to generalize defluorinative semipinacol rearrangements through boron chemistry, aiming to develop them into a novel synthetic tool amenable to drug and agrochemical research. Indeed, our method of triggering semipinacol rearrangements presents a distinct advantage by offering an avenue for late-stage processes only unlocked under the very strict conditions needed to break carbon-fluorine bonds.

Migraine-related differences in connectivity patterns during emotional audiovisual processing revealed by functional connectivity multivariate pattern analysis

Keva Klamer[1], Joshua Craig[1], Christina Haines[1], KiAnna Sullivan[1], Shaylyn Kress[1], Jane O'Connor[1], Peter Seres[2], Chelsea Ekstrand[1]

[1]Ekstrand Neuroimaging Lab, Department of Neuroscience, University of Lethbridge
[2]Peter S. Allen MRI Research Centre, University of Alberta

Migraine is a neurological disorder characterized by headaches, nausea, mood changes, and fatigue. It alters lower-level visual and auditory processing, leading to hypersensitivities that may amplify audiovisual multisensory integration. Migraine has also been associated with increased sensitivity to emotional arousal and valence, though the relative significance of these factors remains unclear. The present study investigates how migraine influences large-scale network interactions during complex audiovisual processing and how these effects vary as a function of emotional arousal and valence. Functional magnetic resonance imaging data (fMRI) data was collected from 22 migraineurs and 21 healthy controls during the passive viewing of three audiovisual films (negative valence/high arousal; positive valence/high arousal; neutral valence/low arousal. Functional connectivity multivariate pattern analysis (fc-MVPA) identified distributed connectivity patterns that differentiate the groups. During both positive and negative high-arousal conditions, fc-MVPA identified a seed within the default mode network (DMN) that exhibited differential whole-brain functional connectivity between groups. Individuals with migraine demonstrated greater within-DMN connectivity relative to controls. Under negative high-arousal conditions only, additional seeds located in the ventral and dorsal attention networks showed altered whole-brain connectivity, characterized by increased cross-network coupling with the visual network in the migraine group. A further significant seed was also identified within the visual network during this condition. These findings indicate that migraine-related network alterations emerge selectively under emotionally charged contexts in DMN, visual and attention related areas, primarily driven by negative valence rather than arousal. Taken together, these results suggest that migraine is associated with network-level differences during emotional audiovisual processing.

Fit for alignment? The effect of shape asymmetry on alignment in a shape fitting paradigm in Goffin's cockatoos (*Cacatua goffiniana*).

Jeroen Zewald[1], Sabina Kozik[2], Joel Colbourne[1], Alice Auersperg[1]

[1]Messerli Research Institute, University of Veterinary Medicine, Vienna, Austria
[2]Faculty of Life, Earth and Environmental Sciences, Université de Bourgogne, Dijon, France

For efficient use of objects in construction or tool use behaviour, efficient object-substrate alignment is a crucial element (e.g. fitting a key in a keyhole). This applies both to humans and other species. Frequently, alignment skills and their development are investigated in humans and other tool-using primates using shape fitting paradigms in which subjects need to insert objects into a complementing shaped aperture (e.g. fitting a triangle in a triangular hole). For most species, the asymmetry of an object seems to drive the difficulty of properly aligning it with a corresponding substrate (e.g. sphere vs cross shape). However, humans tend to use visual alignment techniques while non-human primates use haptic alignment techniques. For tool-using birds, this alignment has not been research in detail yet. The Goffin's cockatoo, an avian model for tool use, has shown to be able to insert simple object shapes. However, their alignment techniques and the effect of shape asymmetry are unknown. Therefore, we investigated their alignment skills in more detail by presenting them with 18 different shapes with different degrees of asymmetry. Using markers on these shapes, we used a machine learning model to track the orientation of the shapes during the trials. We found that the cockatoos had greater difficulty and improved slower with more asymmetrical shapes, mainly using a haptic strategy. Their performance was comparable to non-human tool-using primates, which seem to reflect the complexity and diversity of their tool use, helping us to better understand the limits in the evolution of tool use.

Smart Charging of Electric Vehicles for Renewable Energy Integration in Distribution Networks

Akeem Bamigbola, Robert Benkoczi
Department of Mathematics and Computer Science, University of Lethbridge

The accelerating adoption of electric vehicles (EVs) is placing increasing operational pressure on power distribution networks, which were not originally designed to accommodate large, flexible, and time-varying charging demand. While widespread EV deployment supports decarbonization goals, it also introduces operational challenges: uncoordinated charging can intensify peak loading, provoke voltage violations, overload critical network assets, and increase system losses. At the same time, distribution systems are experiencing growing penetration of renewable energy sources, particularly photovoltaic (PV) generation. Although renewable integration strengthens environmental sustainability, its inherent variability and uncertainty add further operational complexity. Therefore, these trends expose a fundamental coordination challenge: EV charging demand and renewable generation must be jointly managed under physical network constraints while remaining responsive to user requirements, such as charging costs and mobility needs. However, much of the existing literature addresses these dimensions separately, relies on deterministic representations of inherently uncertain processes, or emphasizes single-objective formulations that fall short of real-world operational conditions. This research proposes an intelligent multi-objective smart charging framework for EVs in renewable-integrated distribution networks. The framework captures the dynamic interactions among charging demand, renewable availability, and network constraints, while explicitly accounting for uncertainty in EV behavior and generation profiles. Multiple performance objectives are considered simultaneously, including network losses, voltage deviations, renewable energy utilization, and charging cost. To address the resulting decision complexity, the framework will employ an adaptive exploratory optimization approach to iteratively refine charging strategies while preserving physical feasibility. The proposed framework will be evaluated using detailed distribution network models across varying EV penetration levels and different patterns of renewable generation to assess robustness and scalability. By integrating realistic system modelling with adaptive decision-making, this research aims to advance the methodological foundations of EV smart charging and provide practical insights for the reliable operation of future distribution networks with high renewable penetration.

Interactive effects of parental age and caloric restriction on lifespan in the aquatic plant Lemna minor

Victoria C. Thwaites, Nicola M. Herman, Suzanne L. Chmilar, Robert A. Laird

Many intrinsic and extrinsic factors influence how long an individual lives. Intrinsic factors stem from individual trait differences, whereas extrinsic factors stem from environmental variation. Parental age – the age of an offspring's parent(s) at time of birth – is an intrinsic factor: offspring of young parents typically live longer than offspring of old parents. Caloric intake is an extrinsic factor: individuals subjected to calorie-restricted conditions typically live longer than individuals subjected to unrestricted conditions. Parental age and caloric intake have been shown to independently affect lifespan in animals and plants; however, their interaction has only been investigated in animals. Using the predominantly clonal, aquatic plant Lemna minor (common duckweed) we found that with increasing parental age, offspring lifespan decreased. We also found that when individuals experienced caloric restriction (manipulated by reducing light intensity to slow photosynthesis), their lifespan was extended. When considered together, we found that there was no interaction between parental age effects and caloric restriction. This suggests that while intrinsic and extrinsic factors affect lifespan, they may act upon different physiological mechanisms.

Local-scale abiotic factors and plant communities associated with the presence of an endangered land snail in southern Alberta

Erik Vilu, Carisa McGale, Cameron Goater, Jenny McCune

Quantifying the climatic, topographic, geologic, and biotic variables that define the habitat of threatened species is an important component of conservation strategies. *Oreohelix cooperi* (Black Hills Mountain snail) is an endangered terrestrial gastropod found in Cypress Hills Interprovincial Park (CHIP), Alberta and Saskatchewan. Little is known about the local-scale habitat requirements of this species. We tested the ability of local-scale abiotic characteristics and plant community composition to indicate habitat suitability. We surveyed 131 sites throughout CHIP to record the presence or absence of *O. cooperi*, collect soil, measure topography, and document the associated plant communities. We used logistic regression to test for associations between snail presence and abiotic factors, and an indicator species analysis to find plant species that are more abundant or frequent where snails are present. Snail presence was significantly more likely at sites with high soil calcium, steep slope angle, and the presence of conglomerate rock formations. There were 21 plant species that were significant indicators of snail presence, including Common and Creeping Juniper; Alpine Sweetvetch; Woolly Groundsel; and Cutleaf Anemone, which formed the strongest associations with *O. cooperi;* and Cous Biscuitroot, which is itself critically imperilled (revealing overlap in the habitat of these two species at risk). These results help identify critical habitat for *O. cooperi* and can inform the development and application of species distribution models to predict the potential distribution of *O. cooperi* in CHIP and elsewhere.

Investigating the role of RNA helicases in the life cycle of Old-World Alphaviruses

Carmen Agenbacht, Dr. Trushar Patel
Laboratory of Medicinal Biophysics, University of Lethbridge

Old World Alphaviruses are a group of viruses associated with a broad range of diseases in humans and animals. Infection may manifest in a variety of symptoms such as rash, arthritis, and fever, often resulting in long-lasting and debilitating rheumatic disease as the viruses persist in joint tissue, leading to continual host inflammatory response. Primarily found in Europe, Asia, and Africa, the viruses pose a large public health threat. While no current FDA-approved antiviral treatment or vaccine exists, it is crucial to study these viruses, especially in light of rising temperatures due to climate change, as an increased risk of global spread is possible, given the expansion of the habitats of these mosquito vectors. Alphaviruses exploit host machinery to complete their life cycles. Literature has shown that RNA helicases play an important role and are critical regulators for viral infections. These DEAD-box helicases play a crucial role in regulating various RNA processes. Despite research on helicases' roles in alphavirus replication, the exact function of these enzymes remains unclear, with many of their roles in the viral life cycle still unknown. This proposal aims to investigate the roles of DDX1, 5, 6, 17, 56, DDX3X, and DHX36 in the viral replication of Mayaro, Sindbis, and Semliki Forest viruses. This will provide a deeper understanding of fundamental virology and therapeutic development, providing insight into the functional roles to elucidate the molecular mechanisms underlying their involvement in viral replication.

The Diminishing Hand: What String-Pulling Reveals About Motor Impairment in Parkinson Disease

Maryam Kia[1], Surjeet Singh[2], Samsoon Inayat[3], Majid H. Mohajerani[4], Jon Doan[1], and Ian Q. Whishaw[1]

[1]Canadian Centre for Behavioural Neuroscience, University of Lethbridge, Lethbridge, AB, Canada
[2]The Jackson Laboratory, Bar Harbor, ME, USA,
[3]Department of Psychology, University of Nevada, Las Vegas, USA,
[4]Department of Psychiatry, McGill University, Montreal, Quebec, Canada

Bilateral upper-limb coordination is essential for everyday actions, yet its disruption in Parkinson disease (PD) during continuous bimanual behavior is not well characterized. We examined hand and arm coordination in individuals with PD, age-matched older adults, and young adults using a string-pulling task that requires sequential, hand-over-hand movements. Participants performed the task under real and pantomimed conditions, allowing comparison of movements with and without object interaction. Performance was quantified using whole-body and hand optical flow, kinematic analysis of upper-limb movements, and expert scoring of hand and finger shaping from video recordings. Participants with PD showed marked reductions in hand and finger shaping during lift, grasp, and release phases compared with both control groups. Hand and finger movement velocities were significantly lower in PD, while older adults showed intermediate values between young and PD participants. In contrast, proximal shoulder and elbow kinematics showed minimal group differences, despite robust effects of task condition. Across measures, pantomimed string-pulling altered movement timing and spatial extent but did not eliminate group-specific deficits. These findings show that PD preferentially disrupts distal motor control during coordinated bimanual action, while proximal limb movements remain relatively preserved. Fine-grained measures of hand shaping and finger speed provide sensitive markers of PD-related impairment during naturalistic upper-limb behavior.

Early Life Stress Across Development: Evaluating Rodent Model Sensitivity

Tara Laverty, Nhung Hong, Harvinder Tut, Madison Gal, Joel Pollock, David Euston & Robert McDonald

(All authors affiliated with the University of Lethbridge)

Early life stress (ELS) is associated with long-term alterations in brain development and increased vulnerability to affective and addictive disorders, yet the sensitivity of commonly used rodent ELS models varies across developmental stage and behavioral domain. Neonatal isolation (NI), involving brief repeated separations from the dam during early postnatal life, is a widely used paradigm that reliably produces lasting alterations in stress hormones, but similar behavioural variability to other models of early life stress.

This presentation focuses on original behavioral work from two studies conducted from the same litters of neonatally isolated rats. One study tested adolescent animals on the open field, Morris water maze, and food hoarding tasks to probe anxiety-like behavior, spatial learning, and naturalistic reward-related behavior. Preliminary analyses revealed no robust group differences during this juvenile period. The other study assessed adult rats on the elevated plus maze (EPM), a gambling-like schedule preference task, and the 5-choice serial reaction time task to probe adulthood impulsivity and risk-based decision making. Though there was also no group difference in anxiety behavior as assessed by the EPM, preliminary findings suggest group differences in operant tasks indexing risk-based decision-making and impulse control. These results suggest alterations to adult risk-based decision-making in the absence of broad anxiety-related or learning deficits.

Ongoing analyses will integrate physiological and neural measures to determine whether this behavioral specificity corresponds to circuit-level alterations. Rather than emphasizing uniform stress effects, this talk integrates two studies to discuss how developmental timing and task selection shape the detection of ELS-related phenotypes — highlighting the importance of model sensitivity when studying early life adversity.

Age-Dependent Effects of Amyloid- and Tau-Related Genes on Brain Pathology and Behaviour in Mice

Valérie Lapointe[1], Brendan B. McAllister[2], Jayden Hutchison[1], Avery Burgar[1], Leo Ochieng[1], Giulia Cocco[1], Lucas Ferrari do Amara[1], Precious Olusoji-Akomolafe[1], Majid H. Mohajerani[1], Robert J. Sutherland[1].

[1]Department of Neuroscience, Canadian Centre for Behavioural Neuroscience, University of Lethbridge. Lethbridge, AB, Canada.
[2]Faculty of Veterinary Medicine, Hotchkiss Brain Institute, University of Calgary, Calgary AB, Canada.

Alzheimer's disease (AD), the most common form of dementia, causes progressive memory loss and cognitive decline, profoundly affecting daily life. AD is characterized by the buildup of two harmful brain proteins: amyloid-β (Aβ), which forms plaques outside cells, and tau, which forms tangles inside cells. Brain inflammation is increasingly recognized as another key contributor to disease progression and involves the brain's main immune cells, microglia and astrocytes. Animal models are widely used to study AD. Early models produced unusually high levels of abnormal amyloid precursor protein (APP), often with presenilin 1 (PS1), resulting in strong Aβ buildup but also changes caused by APP overproduction that do not reflect the human disease. The *APP*$^{NL-G-F}$ model was developed to address this limitation by humanizing the Aβ sequence and incorporating three familial AD-linked mutations. Because Aβ buildup alone does not reliably predict cognitive problems, a second model carrying a humanized tau gene (*hMAPT*) was included. To examine the impact of amyloid- and tau-related genes, alone or together, on brain pathology and behaviour, males and females of four mouse strains, *App*$^{NL-G-F}$ x *hMAPT*, *App*$^{NL-G-F}$, *hMAPT*, and C57BL/6 controls, were compared at 8, 12, and 16 months of age. Amyloid pathology was observed only in mice carrying the mutant, humanized App gene, with the highest levels at 8 months in mice expressing both knock-in genes. Astrocyte activation was pronounced in *App*$^{NL-G-F}$-containing strains, while microglial changes were more modest and varied with age and sex. Recognition memory was largely preserved, but spatial learning differed between strains. Mice expressing both genes showed impaired spatial memory, and *App*$^{NL-G-F}$-containing mice showed reduced contextual fear memory at 16 months, with the combined genotype most affected. These findings highlight the usefulness of amyloid- and tau knock-in models for investigating early disease mechanisms, while noting their limitations in modelling late-stage AD.

When Cellular Factories Break: Understanding a Rare Blood Disorder

Anuradha Rai Chowdhury[1], Dylan Girodat [1,2*]

[1]Department of Chemistry and Biochemistry, University of Lethbridge, 4401 University Drive West, Lethbridge, Alberta, Canada T1K 3M4
[2]Department of Chemistry and Biochemistry, University of Arkansas, 1 University of Arkansas, Fayetteville, Arkansas, USA 72701

Inside each cell that constitutes our bodies, we have tiny factories that make proteins essential to life. These protein factories are known as ribosomes and are composed of two biomolecules, called RNA and protein. When something goes wrong with these factories, the protein products they make are put together incorrectly, which can be problematic and cause cancer, or neurodegenerative disease. If a specific component of this cellular machinery is defective, it can result in Diamond-Blackfan anemia (DBA) - a rare blood disorder that affects young children, often presenting with facial or thumb abnormalities, an increased risk of cancer and a shortened lifespan. What remains unknown is how these small defects in ribosomal components change ribosomal-factory output and manifest in DBA. My research tests the hypothesis that DBA-associated changes in one of the ribosomal components, the protein uL5, alter the entire organization of the ribosome, leading to disease symptoms. We use computational simulations to compare structural deviations of the defective uL5 variants with the fully functional wild-type uL5. The results show two types of changes in the protein: an alteration in overall shape of uL5, seen in all variants, including those not linked to DBA and a disease-specific critical change of structure in a key region of uL5 called helix 6. Located in the protein's core, these structural changes could cause instability of uL5. Since a foundational component is unstable, this may explain why the factory does not function at full capacity, ultimately leading to disease, much like a factory trying to function without a key team member. Our study shows for the first time how structural perturbations due to defective ribosomal components correlate with DBA. Furthermore, our simulation approach can predict which uL5 mutations could give rise to DBA, providing a potential screening tool for early identification of the disease.

Ywain the 'Social Monster': A Political Reading of *Ywain and Gawain* through an Embodiment Perspective

Davide Pafumi

This paper reads *Ywain and Gawain* as a political allegory in which the figure of the wild man functions as an index of civilisational decline. Unlike Chrétien's version, which seeks to cultivate and educate the young landless knightly class, the Middle English adaptation explores anxieties linked to the decline of knighthood as a symptom of a larger political crisis. Through the madness episode, the poet deliberately renders Ywain's wild state in binary opposition to Arthurian civilisation, articulated through markers such as clothing, food, and behaviour, as well as through religious imagery associated with the hermit and the Church. By deliberately framing Ywain as a social monster, the poet draws on established literary archetypes of the wild man, amplifying the trope of love-madness to demonstrate the fragility of knightly identity. The monstrous thus becomes didactic, demonstrating the consequences of the knight's social and identity collapse while simultaneously pointing toward remedies through religious order and civic restraint. Positioned within the historical context of the fourteenth and fifteenth centuries — when knighthood itself was widely perceived to be in crisis — the poem's allegory reveals how literary depictions of monstrosity register political anxieties about chivalry and civilisation, and the possibility of remedying them.

Fluorinated Bicyclo[1.1.1]pentyl Transfer Agents: Testing with an Excellent Radical Trap

S. K. Nelson, [1,2] A. Pounder, [1,2] A. E. Thwaites, [1,2] S. D. Wetmore*,[1,2] J.-D. Hamel[1,2] *

(1) Department of Chemistry and Biochemistry, University of Lethbridge, 4401 University Drive West, Lethbridge, Alberta, Canada T1K 3M4
(2) Canadian Centre for Research in Advanced Fluorine Technologies, Department of Chemistry and Biochemistry, University of Lethbridge, Lethbridge, AB, Canada

In pharmaceutical research, bicyclo[1.1.1]pentanes (BCPs) are being investigated as new building blocks to replace a common structural unit: arenes. While BCPs can be used as bioisosteres of *para*-substituted phenyl rings, they possess a unique cage-like shape made of sp^3-hybridized carbons, and this has been found to improve the pharmacological profile of drugs.

This work focuses on the synthesis of fluorinated BCP redox-active esters (RAEs) and their reactivity towards carbon-element bond formation. The goal is to synthesize building blocks incorporating bridgehead-fluorinated or -fluoroalkylated BCPs. This is driven by the proven enhancements that fluorinated fragments can have on pharmaceuticals, such as decreasing toxicity and increasing potency. Imide-based RAEs are positioned on the other bridgehead-carbon of the BCP and provide multiple avenues to make carbon-element bonds, specifically through the formation of a radical on the bridgehead of BCPs after decarboxylation of the RAE.

The current route that is being explored investigates reacting the fluorinated or fluoroalkylated BCP-derived RAEs with electron-deficient alkenes. Originally, this work was done with Michael acceptors but with minimal success. The new route being explored uses allylic trifluorides as more effective radical traps. The goal of this route was to scope and quantify the reactivity of fluorinated BCP transfer agents with a selection of allylic trifluorides with diverse structural properties and eventually apply the new-found knowledge towards other C–C bond forming reactions. This project produced a distinct result with the fluorinated BCP transfer agent generating lower yields when compared to the fluoroalkylated transfer agents. Based on this experimental outcome, computational work was performed to explore the reactivity pathway of the fluorinated BCP to explain the lower yields and provide key data that will guide the development of new bicyclo[1.1.1]pentylation reactions.

Allylic Difluorides and What to Do with Them: Photoreactivity and Applications

Dennis D. Toporkov, Taylor Semeniuk, Jean-Denys Hamel*

Department of Chemistry and Biochemistry, University of Lethbridge

The carbon-fluorine bond is special in that it is the strongest single bond carbon makes. Fluorine can also impart beneficial properties to pharmaceuticals and agrochemicals by enhancing the compounds' lifetime, specificity and lipophilicity. One particular motif our group is interested in are allylic difluorides, that is compounds with two fluorine atoms adjacent to a carbon-carbon double bond. Harnessing the power of light, our group has developed a photocatalytic system to selectively and partially defluorinate allylic difluorides. This method creates monofluoroalkenes while adding chemically and biologically relevant fragments such as protected amino acids, N-alkylanilines and α-keto acids. Furthermore, a second-generation system was developed which employed purely organic photocatalysts as opposed to less environmentally friendly and expensive metal-based catalysts. Additionally, a photocatalytic system with a diverging pathway is currently being developed using allylic difluorides. The goal is to skew the reaction pathway towards hydrofunctionalized products (i.e., to retain both fluorines) while suppressing the monofluoroalkene products. This method aims to merge allylic difluorides with organic building blocks, such as N-heterocycles, leading to fluorinated motifs that are applicable to agrochemical and pharmaceutical research.

Miniature ribosomes as a possible tool for synthetic biology advancements

Carrigan Dawson & Jessica Willi

Department of Chemistry and Biochemistry, University of Lethbridge

Developments in synthetic biology have permitted the engineering of ribosomes within a cell-free system. In doing so, protein synthesis is freed from the constraints of the cellular interface and pressures of cell survival. Using this system, we have generated ribosomal mutants that may serve as a starting point for the synthesis of novel compounds that canotherwise be difficult to engineer. Their potential applications range from healthcare, climate change, and biotechnology. Further, this research has begun to answer questions relating to the origins of life and at which point more complex protein products could be produced. Our methodology consists of utilizing a cell free system for the generation of custom ribosomes. Within this system we monitored the production of proteins that have fluorescent read out such as super folder green fluorescent protein (sfGFP). The observable fluorescence allows for the quantitative determination of higher functioning ribosomal mutants. By reducing the ribosome, we have provided a smaller canvas for future ribosome engineering which allows for the production of ribosomal mutants that may be specific or more efficient at producing certain products. We used a “top-down” approach to minimizing the ribosome. We started at the full 70S Escherichia coli ribosome, then introduced deletions to the ribosomal RNA which mimic evolutionary expansions, these deletions ranged in the size of 12-300+ nucleotides depending on the deletion. Through these segment deletions in the rRNA, we demonstrated that these smaller ribosomes can produce functional protein products. These “mini” ribosome’s ability to synthesize proteins present a starting point for engineering translation apparatuses towards new substrates and answering evolutionary related questions including those relating to the origins of more complex life.

What Makes Uncertainty Engaging? A Cross-Species Test

Madison A. Gal, Tara Laverty, Joel Pollock, David R. Euston

University of Lethbridge, Canadian Center for Behavioral Neuroscience

Slot machines deliver rewards unpredictably—a feature linked to persistent gambling. But what exactly keeps the rewards engaging: the random number of spins or the variable delay between rewards? To test this, we used an animal gambling model in which rats chose between a random ratio reward schedule (RR; like a slot machine) and a fixed-ratio reward schedule (FR; like piecewise work). We quantified RR preference by measuring how often animals chose RR over an FR option that became progressively less effortful. We contrasted this with a parallel test in which rats chose between fixed vs variable delays, matched to the ratio-task timing. Rats showed a robust preference for RR even when FR became substantially easier, whereas they showed minimal bias towards variable delays. To replicate these findings in humans, college-aged participants chose between two concurrently available slot machines, one RR and the other FR. Two studies (N1=45 and N2=101 participants) failed to show a consistent RR bias either in choice behavior or a game experience questionnaire; however, small gender-specific biases were observed. By identifying whether ratio variability or delay variability better predicts persistent choice, this work helps clarify structural features that sustain gambling and highlights targets for mitigation.

Examining ecological factors influencing object manipulation in Balinese long-tailed macaques

Brooke Third, Jeroen Zewald, & Jean-Baptiste Leca

Play is a functionless, intrinsically rewarding, exaggerated, and repeated behavior, performed in the absence of stress1. In human-dominated landscapes, Balinese long-tailed macaques handle a wide range of artificial objects. These objects are integrated into forms of object manipulation that are expressed both routinely and spontaneously. However, the ecological factors underlying the expression of the two apparently playful and functionless forms of object manipulation in this population – bottle game and bead handling – have not yet been thoroughly examined. Utilizing an ecological approach, I aim to test whether these two types of object manipulation are a form of object play, and if so, how human proximity and density, individual manipulative profiles, neophilic preferences, and various object properties contribute to shaping these two forms of object manipulation. Our team sampled 195 individuals across five groups of provisioned, free-ranging, habituated long-tailed macaques living around the Uluwatu temple in Bali, Indonesia from July to November 2025. Three observational sampling methods were used: focal-animal sampling, group scan sampling and ad libitum sampling. Two experiments were conducted, the first tested novel object neophilia and object categorization preferences while the second tested object salience preferences. We are analyzing 903 video-recorded focal follows, ad libs and experiments to determine novel object neophilia, individual play profiles, behavioral actions expressed and object preferences. Investigating artificial object play in animals inhabiting anthropogenic environments has implications for understanding behavioral flexibility and the evolution of material culture in this species, as well as for informing assessments of mental health and animal welfare.

Beyond Individual Coping: Systemic Demands, Resilience, and Burnout in Early Career Teachers

Madeleine Froehlich (M.Ed.) & Dr. Thelma Gunn

Teacher shortages, burnout, and attrition remain pervasive global challenges, with early career teachers (ECTs) at heightened risk of leaving the profession before reaching their full professional potential. This study, grounded in the Job Demands-Resources (JD-R) model, examined how ECTs' coping strategies operate as personal resources within high-demand occupational contexts. Using a cross-sectional, convergent mixed-methods design, Canadian early career teachers (N=311) within the first five years of practice completed an online survey measuring coping, resilience, burnout, intention to leave, and included qualitative open-ended questions. Quantitative analyses were conducted using descriptive statistics, bivariate correlations, and multiple linear regressions, while qualitative responses were analysed through an inductive and deductive brief-text thematic approach. ECTs most frequently endorsed engagement-oriented, emotion-focused, and social strategies. Notably, active coping, emotional support, and positive reframing predicted higher resilience and lower burnout and turnover intentions in line with JD-R theory, whereas behavioural disengagement and self-blame predicted poorer outcomes. Qualitative findings paralleled the quantitative data, highlighting the centrality of social support as both an emotional buffer and a practical scaffold amid overwhelming demands and systemic constraints. Overall, the study underscores the necessity for multilevel interventions to strengthen collegial and organizational support, promoting sustainable well-being and retention.

Beyond Bath Bombs and Self Care: Practical Ways to Flourish in Teaching

Danielle Low

After nearly abandoning teaching for the second time, this work chronicles one educator's resolve to reclaim the profession with joy and purpose. Reeling from the loss of her mother and other colleagues, this educator faced profound grief, relentless emotional labor and deepening burnout. What started as personal survival became a mission to empower others. Grounded in lived experience, educator burnout research, and positive psychology interventions, this presentation champions teacher well-being as a fundamental for resilient professionals and vibrant learning communities. Even non-educators will find practical guidelines, mindset shifts, and strategies to cultivate vitality. This life is not about staving off burnout; it is about sparking true flourishing. Embedding wellness principles into daily practice and school culture is essential.

The effect of environmental variability on lifespan, reproduction, and population size in Lemna minor

Nicola Herman, Suzanne Chmilar, Robert Laird, Victoria Thwaites

Traits of organisms and populations are often nonlinearly related to environmental conditions. When this is the case, such traits are predicted to respond differently to constant versus variable conditions, even when the mean values of these conditions are the same. To test this in the aquatic plant *Lemna minor*, we compared constant and variable light regimes with the same average light intensity to assess whether variable photosynthetic caloric availability affects individual lifespan and reproduction, and population size. Lifespan did not differ between plants grown under constant and variable light. However, variable light conditions resulted in lower reproductive output and lower population mass than constant conditions. These results demonstrate that environmental variability can impact biological responses in *Lemna minor* in ways not predicted by mean values alone.

How is urbanization affecting population connectivity of northern house wren *Troglodytes aedon* in Alberta?

Milan Baral and Theresa M Burg
Department of Biological Sciences, University of Lethbridge

Urbanization transforms land use type and fragments habitats restricting animal movements, reducing population connectivity and limiting gene flow. This results in genetic isolation and reduces genetic diversity within populations. Despite the importance of genetic diversity, information on how urbanization affects gene flow among populations and levels of genetic diversity are scant. Our study focuses on exploring the influences of urbanization on the population connectivity of the northern house wren (Troglodytes aedon) in Calgary and Lethbridge. Firstly, we used species distribution model (SDM) to determine areas of suitable habitats for northern house wrens in urban and nonurban areas and used the ratio of built-up area to ground area in ArcGIS to quantify the degree of urbanization. We used these results to help select three urban sites in Lethbridge, four urban sites in Calgary and one nonurban site around each city and sampled five northern house wrens at each site. We genotyped the samples using low-coverage whole genome sequencing and will use Bayesian clustering and least-cost corridor model to determine the genetic structure and population connectivity of house wren respectively. Our study will provide information on how urbanization affects connectivity in urban wildlife populations and can be used to inform urban planning to maintain biodiversity in cities.