20th Randy Kobes Undergraduate Research Symposium

The 20th Randy Kobes Undergraduate Research Symposium displays some of the excellent quality research by undergraduate students at the University of Winnipeg. This event is a valuable opportunity for students to obtain experience in presentations of scientific research, especially because much of the research presented will ultimately be published in leading scientific journals.

2025

November 19, 9:30 – 12:30pm

JUDGES REVIEW

12:30 – 1:30pm PUBLIC VIEWING/RECEPTION

Sponsored by Bioscience Association of Manitoba

November 21, 12:30 – 1:30pm

AWARDS CEREMONY

In conjunction with the flipped 3MT event held in Leatherdale Hall

THE UNIVERSITY OF WINNIPEG

RANDY KOBES

The poster contest has been named in memory of Professor Randy Kobes, Associate Dean of Science and Professor of Physics. Dr. Kobes' untimely death on September 18, 2010 represents a great loss to the University of Winnipeg and to the world of science. A co-founder of the annual poster contest, Dr. Kobes was committed to research, especially with undergraduate students.

AWARD CEREMONY Acknowledgments

Thank you to those who are a part of the Awards Ceremony on November 21.

Tabitha Wood – Acting Dean of Science & Professor
Melanie Martin – Acting Associate Dean of Science & Professor
Glen Bergeron – Faculty member in the Gupta Faculty of Kinesiology & Applied Health at UofW, and MMSF Representative

SPONSORS:

We gratefully acknowledge sponsorship from:

The University of Winnipeg Dean of Science Office

THE UNIVERSITY OF WINNIPEG | Faculty of Science

BAM, Sponsor of the Reception

BIOSCIENCE ASSOCIATION MANITOBA bam

VP Research & Innovation, Sponsor of the Ecological & Environmental Science prize money

THE UNIVERSITY OF WINNIPEG | Vice-President, Research and Innovation

Manitoba Medical Services Foundation (MMSF), Sponsor of the new Health Science prize

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GUEST JUDGES:

We'd like to thank the following people for choosing the award recipients:

Akshi Malik – Senior Policies & Contracts Specialist, CCMB
Alfonz Koncan – A. Koncan & Associates Ltd.
Ashley King – Program Officer, Research Manitoba
Blake Podaima – Principal, Virtuistix Inc.
Camila Rolim – Office of the VP, Research
Carolyn Garland – Awards & Communications Officer, Faculty of Graduate Studies
Corey Sanderson – UW Alumnus
David Pankratz – MLA for Waverly
Emilie Kobes – UW Collegiate Alumna & Daughter to Randy Kobes
Jaime Orr – Research Data Management Librarian, UW Library
Janelle Hacault – VP Industry Development & Partnerships, Bioscience Association Manitoba (BAM)
Janice Reyes Bain – Administrative Assistant to the Dean, UW Library
Jasper Arthur – Research Officer, National Research Council of Canada
Kathryn Boschmann – Research Project Director, MB Indigenous Tuberculosis History Project, UW Dept. of History
Kent Suss – Budget, Programs, & Priorities Officer
Larissa Wodtke – Director of Academic Programming & EDI
Mika Castro – Office of the VP, Research
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Rachel Keijzer – Program Manager, Research, RRC Polytech
Sarah Kobes – UW Alumna & Daughter to Randy Kobes
Sean Barr – Assistant Deputy Minister, Prairies Economic Dev. Canada
Theresa Mackey – Program Officer, Research Implementation & Ethics, Office of the VP, Research
Will Burton – Lecturer, Access Education, UW Faculty of Education
Yasmin Iman – Program Officer, Research Manitoba

1. **Presenter: Alejandro Civetta**
   "Do cells other than myelinated axons contribute to MRI estimates of axon sizes?"

   Supervisor: Melanie Martin
   Department: Sciences
   Category: Biological Sciences
   Abstract: New diffusion-MRI method inferring micron sized-axon diameters overestimates intra-axonal volume fraction in the mouse corpus callosum (CC). MRI might be inferring sizes of all cells, as cell walls and myelin restrict water diffusion within tissues. To test this, ten CC 9.4µmx6.6µm EM images from three female mice were analyzed. Diameters of every fully visible cell were measured. Mean diameters were calculated for myelinated axons, all other cells, and all cells together. All groups show significantly different axon diameters (p=0.004), with average differences of 0.32 µm (95% CI:0.23–0.41µm), Non-myelinated cells were too small for MRI resolution, but likely affect MRI-derived volume fraction due to their abundance and restricted intracellular water diffusion. Further study of EM volumes are needed to compare with MRI results.

2. **Presenter: Conner Fraser**
   "Towards New Methods for Sex Determination in an Archaic Age Cuban Population"

   Supervisor: Yadira Chinique de Armas & Luis M. Viera Sanfiel
   Department: Bioanthropology
   Category: Biological Sciences
   Abstract: The aim of this research was to employ geometric morphometric techniques to build a foundation for assessing trends in sexual dimorphism at the archaic age cemetery of Canímar Abajo. A set of 17 mandibles were assessed using principal component analysis to identify new traits relevant for sex assessment. The results of this analysis indicated that PC6, characterizing the gonial angle, did correlate with sex but only accounted for 2.1% of the variance. Unfortunately, the significance of PC6 could not be determined due to limited i) genetic data, and ii) sample size. Future efforts will aim to remedy these issues by increasing our archaic age samples size with contemporary sites and introducing alternative methods of sex identification (i.e., proteomics) to rapidly increase the number of known sex individuals.

3. **Presenter: Nicole Valencia**
"Spaghetti, neurons, and diffusion MRI, oh my! A Monte Carlo simulator for increased accuracy in axon diameter measurements"

Supervisor: Melanie Martin
Department: Physics
Category: Experimental Physical Sciences
Abstract: The brain is made of neurons, featuring projections called axons that carry electrical signals needed for daily living. Healthy axons are like al dente spaghetti because they are firm and strong, while unhealthy axons affected by diseases like multiple sclerosis, are subject to degradation similar to overcooked spaghetti. Measuring axon diameters helps track disease but is only possible with electron microscopy (EM), which requires dead tissue. Diffusion magnetic resonance imaging (MRI) is a method that can estimate axon diameters in living people, but is less accurate for smaller axons, such as those found in mice. To improve this, computer models are used, however they can suffer from assumptions like thinking axons are uncooked spaghetti. This research shows the development of a new model for greater accuracy and improved measurements.

4. **Presenter: Ifeoluwaposimi Olowola**
"An Investigation of the Physiological Behaviours in Caenorhabditis elegans in Response to Elevated Serotonin Levels via Psilocybin Microdosing"

Supervisor: Paul Holloway
Department: Biology
Category: Biological Sciences
Abstract: Feeding in Caenorhabditis elegans occurs through rhythmic pharyngeal pumping mediated by serotonin. Elevated serotonin levels cause irregular pump patterns. Since psilocybin's active metabolite, psilocin, is a serotonin receptor (5-HT2AR) agonist, this experiment tested whether psilocybin microdosing would similarly disrupt pumping. Three groups were analyzed: an untreated control, a Prozac-treated positive control, and a psilocybin-treated group. Pumping was observed at 100x magnification, with irregular pumps defined as fluctuating speeds, pauses, or bursts. Worms treated with psilocybin showed patterns similar to those treated with Prozac—mostly irregular pumping, though some maintained steady rhythms. Both treatment groups had higher average pump rates (45 pumps per 20 seconds) than controls (39 pumps per 20 seconds). These results suggest psilocybin elicits serotonin-mediated effects comparable to Prozac, supporting its potential as a therapeutic for mood disorders.

5. **Presenter: Chishosi Mika**
"Interventional Cardiology Today: Innovation, Prevention, and the Future of Coronary Artery Disease Treatment"

Supervisor: Caleb Hasler
Department: Biology
Category: Biological Sciences
Abstract: Coronary artery disease (CAD) results from plaque proliferation that restricts blood flow to the heart, arising from both environmental and genetic factors. Angioplasty with Stenting offers a less invasive alternative to bypass surgery with over 95% success rate and improved outcomes using modern drug eluting stents. Patients characteristics such as sex, age, and coexisting conditions affect the effectiveness of the angioplasty with stenting. Ongoing research in artificial intelligence and intravascular imaging continue to increase precision, safety and long term effectiveness in treating CAD.

6. **Presenter: Tyrone Reimer**
"Diamond like Carbon Coatings for Ultra Cold Neutrons"

Supervisor: Russell Mammei
Department: Physics
Category: Health Sciences
Abstract: This poster will cover a brief overview of the creation of Diamond like Carbon (DLC) coated tubes and their purpose for an experiment at TRIUMF (Canada's particle accelerator center). The focus of the poster will be covering my contribution and process of the new design of the target mounting system used to create the DLC.

7. **Presenter: Leena Tetrault**
"Pigmentation as an Indicator of Immune Response During Natural Parasite Recruitment in Aquatic Snails"

Supervisor: Caleb Hasler & Jillian Detwiler (UofM)
Department: Biology
Category: Biological Sciences
Abstract: Aquatic snails are intermediate hosts in trematode life cycles, yet their immune defenses remain poorly understood. Pigmentation, particularly melanin, is associated with immune activation in invertebrates and may indicate infection status or resistance. This study investigated whether pigmentation intensity correlated with parasite infection during natural recruitment. Laboratory-raised Stagnicola elodes and Stagnicola reflexa were introduced into a wetland and subsampled biweekly for imaging and dissection. Metacercarial infections were identified by morphotype, and foot pigmentation quantified using ImageJ. Infection prevalence did not differ between species ($p = 0.754$), though tetracotyle metacercariae were more

prevalent and appeared earlier (week 2) than echinostomes (week 4), indicating faster parasite development. Pigmentation increased after exposure, suggesting activation of immune defenses. Overall, results support pigmentation as a non-invasive marker of immune activity and host resistance.

8. **Presenter: Smit Panchal**

"Exploration of parameter space of Cosmic Inflation model using MCMC."

Supervisor: Evan McDonough
Department: Physics
Category: Mathematical & Theoretical Physical Sciences
Abstract: This talk is about a understanding a cosmic inflation model which has two scalar field Spectator and Inflaton that leads to enhancement in PBH production, and we will use MCMC to understand the parameter space of this model to understand the correlation and degeneracies.

9. **Presenter: Alex Martin**

"From Molecules to Space Clouds: Teaching Quantum Computers About Energy"

Supervisor: Jeff Martin
Department: Physics
Category: Experimental Physical Sciences
Abstract: Quantum computers are improving, and scientists are looking for algorithms that work on the quantum hardware we have today. One promising candidate is the Variational Quantum Eigensolver (VQE). VQE is a way to use a quantum computer to estimate the energy levels of small systems, like molecules. A simple model of an interaction that creates the 21-cm hydrogen line (light that astronomers see from space) is constructed, and the VQE is performed on a quantum computer to find the lowest energy configuration of the system. Finally, the real-world applications and the importance of quantum simulations to chemistry, drug design, and astrophysics are discussed.

10. **Presenter: William Watt**

"Development of a Low-Cost Hyperspectral Scanner Using a Spectroscope"

Supervisor: Michael Beck & Christopher Bidinosti
Department: Physics/Applied Computer Science
Category: Experimental Physical Sciences
Abstract: Hyperspectral imaging is a technique that generalizes ordinary RGB-imaging by deploying more than three channels. Typically, each channel is a few nanometers wide, ranging across visible light through near-infrared. Each pixel in a hyperspectral image contains full spectral information from which more information about the imaged object can be inferred, like determining its material or chemical/biological properties (e.g., determining the healthiness of plants). However, hyperspectral cameras are expensive, ranging C$20000-100000.

Spectroscopes also determine the spectrum of a material but provide no spatial resolution (only 1 "pixel"). The research explores the possibility of adding spatial resolution through combining continuous probe readout with mechanical movement to perform a hyperspectral "scan" as a cost-effective alternative (parts <$2,500) to hyperspectral cameras. Current capabilities and the direction of future work is discussed.

11. **Presenter: Claire Davis**

"Sediment phosphorus concentrations within the Red River Valley"

Supervisor: Nora Casson
Department: Geography
Category: Ecological & Environmental Sciences
Abstract: Phosphorus runoff into streams, especially through snowmelt, is the largest contributor to algal blooms and worsening water quality in Lake Winnipeg. The objective of this study was to quantify sediment P content in streams from contrasting land uses across the Red River Basin (RRB), a major contributing area of nutrient loading to Lake Winnipeg. Sediment samples were taken from 25 streams within the RRB and analyzed for available phosphorus using Olsen's method (NaHCO3) and water (H2O) soluble phosphorus. There was considerable variation in available phosphorus concentrations between samples. This data can be used in developing targeted management practices for reducing phosphorus loss within the RRB, and subsequently to Lake Winnipeg.

12. **Presenter: Tia Plawicki**

"Assessing the Riparian Cover Change in Critical Habitat Zones of Nooksack Dace and Salish Sucker"

Supervisor: Anas Usoof
Department: Biology
Category: Ecological & Environmental Sciences
Abstract: Critical habitats are areas designated as essential for the survival of species that are endangered, extirpated, or threatened.1 Included within critical habitats are forested riparian zones, which play an important role in protecting streams and supporting aquatic wildlife.2 This research assessed changes in forested riparian cover of two critical habitats for the Nooksack Dace and Salish Sucker in Lower

Fraser Valley, British Columbia, with the intent to determine whether there had been a net gain or loss since these fish were marked as endangered. Using satellite imagery, this research identified an overall net loss in forested riparian within the critical habitat zones. The findings of this research are important for conservation strategies, specifically to prevent further population declines of the Nooksack Dace and the Salish Sucker.

13. Presenter: Allyza Tabirara

"Sediment Phosphorus Levels in FortWhyte Alive Lakes"

Supervisor: Nora Casson
Department: Biology/Geography
Category: Ecological & Environmental Sciences
Abstract: Urban lakes are susceptible to eutrophication due to excess nutrients from the surrounding watershed. This is a particular problem at FortWhyte Alive, an environmental education centre in Winnipeg, MB. A long-term monitoring program at this site has revealed differences in phosphorus concentrations among their five lakes, however the reasons for these differences are not well understood. One potential explanation is differences in sediment phosphorous processes. To begin to investigate this issue, we undertook a preliminary survey of sediment phosphorus content in the summer of 2025. Using grab samples, we collected sediment from each lake and analyzed the water-extractable and Olsen phosphorus in the lab. Our results suggest that sediment phosphorus content is somewhat related to surface water phosphorus concentrations, and further work can investigate mechanisms behind this pattern.

14. Presenter: Kristi Peters

"Analyzing Cryptoendoliths within Mars Analogue sites: with Implications of Finding Life on Mars"

Supervisor: Jay Maillet
Department: Geography
Category: Ecological & Environmental Sciences
Abstract: Microorganisms serve as critical agents in providing insights into life's resilience on Earth and for the viability of life beyond. Microorganisms, specifically endoliths can serve as analogous for extraterrestrial environments like Mars as they have been able to colonize the most extreme environments and inhospitable on Earth. Furthering the knowledge of how these microorganisms are able to survive these conditions is paramount for future life detection missions. A key challenge remains to elucidate the mechanisms that allow these extremophiles to endure these conditions, as well as in developing advanced field and analytical techniques to detect biosignatures of cryptoendolithic life in terrestrial gypsum, with the ultimate goal of applying these methods to future Mars sample return missions.

15. Presenter: Kyra Hodges

"Examining how sex influences the neurophysiological and perceptual responses to inspiratory muscle loading."

Supervisor: Yannick Molgat-Seon & Natalie Richer
Department: Kinesiology & Applied Health
Category: Health Sciences
Abstract: Females report higher breathlessness (i.e., dyspnoea) than males; however, the neurophysiological mechanisms remain unclear. We examined the relationship between cortical activation and dyspnoea perception during inspiratory pressure threshold loading (IPTL) in males and females. We hypothesized that females would exhibit greater respiratory-related cortical activation for a given inspiratory load, and that cortical activation would be associated with dyspnoea, regardless of sex. Eighteen healthy adults (n=6 males, n=12 females) completed incremental IPTL while cortical activity was monitored using electroencephalography (EEG). EEG spectral power increased significantly with inspiratory load (all $p<0.05$), regardless of sex (all $p>0.05$), and was not significantly associated with dyspnoea (all $p>0.05$). Our data highlight the multifactorial nature of dyspnoea perception and provide unique insight regarding sex-differences in dyspnoea perception.

16. Presenter: Priyanshu Mittal

"Early Prediction and Delayed Diagnosis of Human Metapneumovirus (HMPV) Using AI Models"

Supervisor: Tabitha Wood & Melanie Martin
Department: Applied Computer Science
Category: Health Sciences
Abstract: Human Metapneumovirus (HMPV) is a respiratory pathogen often misdiagnosed due to overlapping symptoms with other viral infections, leading to delays in treatment. This project explores the use of artificial intelligence to improve early detection and prediction of HMPV. by analyzing clinical, demographic, and symptom data, we aim to identify key predictive markers that can assist healthcare providers in distinguishing HMPV cases earlier. Our approach combines data preprocessing, feature selection, and machine learning models to evaluate diagnostic accuracy. Early prediction of HMPV has the potential to reduce misdiagnosis, enable timely interventions, and improve patient outcomes. This research highlight how AI can support healthcare decision-making in addressing underdiagnosed respiratory illnesses.

17. **Presenter: Jordan Pimentel**

"Shame, Social Anxiety, and Emotion Regulation Strategy Choice: Performance Based Emotion Regulation Strategy Selection for Socially Anxious Individuals Experiencing Shame"

Supervisor: Bev Fredborg
Department: Psychology
Category: Health Sciences
Abstract: Social Anxiety (SA) is associated with maladaptive emotion regulation strategy use and high levels of shame. However, there is a paucity of research which considers how socially anxious individuals choose to regulate their emotions when they are feeling shame. The current study took place over two timepoints. At timepoint 1 participants completed a series of measures of SA and shame. At timepoint 2 participants completed an in-laboratory performance-based emotion regulation strategy choice paradigm. In line with extant research, participants chose to distract more frequently for high intensity images. At the current moment, no other hypotheses were supported due to the limited sample size. This research is the first to consider how shame and SA simultaneously influence emotion regulation strategy choice.

18. **Presenter: Lucy MacDougall**

"Brain on milk: Can fat bubbles in human milk fight inflammation?"

Supervisor: Sanoji Wijenayake
Department: Biology
Category: Health Sciences
Abstract: Human neonates are born with underdeveloped immune systems. This increases the risk of contracting infections early in life. The resident immune cells of the central nervous system (CNS), microglia, help with brain development and maintain the status quo. Microglia can change their functions in response to stress. While short-term changes can be beneficial and help protect the brain, long-term stress responses can be problematic. Interferon-gamma (IFN-γ) is a known immune stressor of microglia. Tiny fat droplets in human milk called milk-derived extracellular vesicles (MEVs) can fight stress and help protect neonates My study looks at how MEV treatment may help microglia recover from an immune stress by IFN-γ. To do this, I will measure the gene expression profiles of homeostatic, pro-inflammatory, and anti-inflammatory biomarkers using RT-qPCR and western blotting.

19. **Presenter: Flora Easter**

"Intestinal Passage as a Dispersal Pathway for Aerobic Soil Predators in Plant-Based Digestive Systems"

Supervisor: Paul Holloway
Department: Biology
Category: Biological Sciences
Abstract: This project explores whether herbivore digestion functions as a dispersal pathway for predatory soil bacteria, specifically Myxococcota. These microbes form myxospores capable of surviving desiccation and heat, but their environmental movement remains largely unknown. The working hypothesis proposes that myxospores endure gut passage, remain dormant under anaerobic conditions, and germinate once excreted into oxygen-rich dung or soil.
The poster outlines a conceptual framework linking three ecological processes: microbial predation, soil nutrient cycling, and the carbon redox loop connecting plants, animals, and soil. It suggests that herbivores may unintentionally be transporting dormant microbial predators between habitats. Once reactivated, these predators could accelerate nutrient mineralization, releasing nitrogen, sulfur, and carbon dioxide--Contributing to soil fertility.

20. **Presenter: Brandon Wittmeier**

"New Models of the Universe: A No Boundary Perspective"

Supervisor: Evan McDonough & Samar Safi Harb
Department: Physics
Category: Mathematical & Theoretical Physical Sciences
Abstract: How did the universe begin and how should we interoperate theories about the start of our universe? To aid us in our search for the answer to this question we need the stories and testimonies of prominent figures in physics. So far Dr. Evan McDonough, Dr. Samar Safi-Harb, and I are looking at theories of how our universe may have begun through different theories. We have special emphasis on James Hartle and Stephen Hawking's no boundary proposal of the universe.

21. **Presenter: Hope Human**

"Molecular Wingmen: Characterizing Drosophila melanogaster seminal fluid proteins"

Supervisor: Alberto Civetta
Department: Biology
Category: Biological Sciences
Abstract: Seminal fluid proteins (SFPs) are transferred from male to female during copulation and can trigger physiological responses in females. SFP genes are known to evolve faster than non-reproductive genes, often showing rapid changes even between closely related

species. For some SFPs, a gene may be lost in one species or gained in another, causing a gene to be unique to one species only. We hypothesize that such unique genes can contribute to reproductive isolation between species. Several bioinformatic databases identified genes unique to one of two closely related species. Two SFP genes, Acp98AB and CG43147, became of interest due to their lack of homology between species and/or their availability of tools for gene manipulation. Gene knockouts were used to determine how genes Acp98AB and CG43147 affect post-mating reproductive fitness.

22. Presenter: Akshdeep Gill

"Running Simulations of Black Holes"

Supervisor: Andrew Frey
Department: Physics
Category: Mathematical & Theoretical Physical Sciences
Abstract: Black holes form when energy gets packed so densely that gravity causes not even light from escaping. The goal of this research was to study the formation of black holes, specifically how long they take to form given an incoming wave of energy. These simulations are incredibly computationally demanding, making them virtually impossible to research on any normal computers. Hence, we used supercomputers from the Digital Research Alliance of Canada to run these simulations. My main job was managing and analyzing data from the simulations and continuing them if needed. We found that our results matched predictions that the time to form a black hole is the inverse square of the wave.

23. Presenter: Jessica Ducharme

"Understanding The Effects Of Grind Spacing When Mimicking MRI Estimates Of Axon Diameters Using Electron Microscopy"

Supervisor: Melanie Martin
Department: Physics
Category: Biological Sciences
Abstract: This project explores how grid spacing affects axon diameter estimates when mimicking MRI measurements using electron microscopy (EM). EM provides high-resolution images at the nanometer scale, while MRI estimates much larger structures. Using EM images from six healthy 12-week-old mice, grids of different sizes (0.10–0.25 μm^2) were applied to measure axon diameters along a single direction. This would assist in determining if grid spacing causes variations, and if biological factors like sex should be considered when refining MRI methods for microstructural studies.

24. Presenter: Jana King

"Mysterious Death of Common Carp – Potential Hazard to Scanterbury Residents"

Supervisor: Jay Maillet
Department: Geography
Category: Biological Sciences
Abstract: In June of 2020, the northernmost part of the Red River and Lake Winnipeg south basin experienced elevated carp mortalities. Similarly, other regions of the world also experienced mass carp die offs which are believed to have originated from several of different factors. Unfortunately, researchers have yet to discover why common carp species were washing up dead on shores in Manitoba. This is not only concerning for the health of local fisheries, but also for the residents of a nearby Indigenous community called Scanterbury. This particular region sources their water from the Brokenhead River, which runs off the south basin of Lake Winnipeg. Considering the rise of algal blooms, red flags have caught my eye to study the relationship between carp and water quality. I plan to conduct my research in the Netley-Libou marsh, Lake Winnipeg south basin, and the Brokenhead River. I am going to use methods such as measuring temperatures, water depth, phosphorus, nitrogen, oxygen, potential hydrogen, tissue sampling, bottom sampling, shoreline sampling, polymerase chain reaction testing, visual observations, public surveys, and meetings to share and discuss findings. This research is significant as residents of Scanterbury are potentially at risk of exposure to toxic chemicals of treated and untreated water, both of which are linked to a large number of life-threatening health concerns. Raising awareness through research may promote advocacy for the implementation of preventative measures for local communities, wildlife, and ecosystems.

25. Presenter: Anna Harms

"Data taking for the Water Cherenkov Test Experiment"

Supervisor: Blair Jamieson
Department: Physics
Category: Experimental Physical Sciences
Abstract: This poster will cover a brief overview of the creation of Diamond like Carbon (DLC) coated tubes and their purpose for an experiment at TRIUMF (Canada's particle accelerator center). The focus of the poster will be covering my contribution and process of the new design of the target mounting system used to create the DLC.

26. **Presenter: Kiara Eggerman**

"Beneath The Scales: Histological Analysis of Juvenile Brook Trout (Salvelinus fontinalis) Exposed to Elevated Temperature and CO2"

Supervisor: Caleb Hasler
Department: Biology
Category: Biological Sciences
Abstract: Increasing dissolved carbon dioxide (CO2) levels and temperature are detrimental to freshwater biodiversity and are a direct consequence of climate change. Both CO2 and
temperature are known stressors for brook trout (Salvelinus fontinalis), a freshwater species native to North America with economic importance. The objective of my study was to determine if elevated CO2 and temperature levels resulted in tissue-level changes. Juvenile brook trout were exposed to both elevated CO2 and temperature, sampled to obtain gill, liver, kidney, and intestine tissues, and samples underwent tissue analysis. If CO2 and temperature are significant biological stressors for brook trout, I hypothesized elevated conditions would cause structural changes to these tissues. Additionally, I predicted that the tissues from the combined treatment of high CO2 and high temperature would be the most impacted.

27. **Presenter: Oluwatofunmi Olaleye**

"Developing Novel Pathways for Phosphine Synthesis via Redox Active Esters"

Supervisor: Roman Belli
Department: Chemistry
Category: Experimental Physical Sciences
Abstract: This project aims to develop chlorine-free methods for converting main group elements such as phosphorus, germanium, and silicon from their naturally occurring ores into chemically functional forms. Current industrial processes are highly energy-intensive, and rely on toxic chlorine gas. In addition, some of these elements, e.g. germanium, are endangered, making the development of more sustainable processing methods crucial. This research explores the use of photocatalysis and mechanochemistry, along with abundant and inexpensive feedstock chemicals, to create environmentally friendly and sustainable routes to functional precursors of value-added compounds. Focusing first on phosphorus, phosphines were targeted through a three-step process involving redox-active ester synthesis, photocatalyst synthesis, and phosphine formation. To date, 10 of 11 redox-active esters have been synthesized, providing an essential foundation for the next phase of this research.

28. **Presenter: Simon Pankratz**

"Using An Ion Probe To Improve DLC Coatings For Neutron Guides"

Supervisor: Russell Mammei
Department: Physics
Category: Experimental Physical Sciences
Abstract: In the search for physics beyond the Standard Model, the TUCAN collaboration is attempting to measure the theoretical neutron Electric Dipole Moment (nEDM). New improved neutron guides coated at the U of W with a thin film of Diamond-Like-Carbon (DLC) will be used to carry neutrons to the nEDM experimental apparatus at TRIUMF. To improve the neutron reflecting properties of DLC films, the kinetic energies of carbon ions deposited should be around 100 eV. An ion probe can be used to characterize the ion plume, mapping these energies. Using this information the plume can be restricted to only allow ions around 100 eV to reach the guide to build the film.

29. **Presenter: Helena Zychowski**

"Impacts of Climate Change on the Carbon content of Boreal soils"

Supervisor: Nora Casson
Department: Geography
Category: Ecological & Environmental Sciences
Abstract: Climate change is intensifying droughts in the boreal forest, threatening soil carbon storage and dissolved organic matter (DOM). The increase of droughts impact the quality and quantity of DOM. This study analyzed soil samples from the IISD-Experimental Lakes Area to assess the spatial variation of soil carbon across various depths and locations. Samples were dried, sieved, and incinerated to quantify carbon content. Results revealed higher carbon concentrations in surface soils (0–10 cm) than deeper layers (10–20 cm), with notable variability across sites. Findings highlight how drought-driven soil carbon loss is spatially heterogeneous.

30. **Presenter: Marika Howell-Favell**

"Nipiy: Water Flowing in our blood"

Supervisor: Nora Casson
Department: Geography
Category: Ecological & Environmental Sciences
Abstract: Nipiy is the Ininímowin word for water. We are all related by Nipiy because she gives life to all whom she flows through. Nipiy herself is a relative because of this. A relative who I know closely, and through working with her have met my other relatives. Relatives who some, depending on who you ask, might not consider them relatives, as well

as relatives who of the same bloodline who were previously lost from colonization. Both I consider to be relatives through Nipiy. Centreing Nipiy I map my journey of meeting relatives through the lens of our relative Nipiy.

31. **Presenter: Elena Ashett**

"Risky Business: Water Health and the Unknown Impact of Lithium Mining in Northern Manitoba"

Supervisor: Jay Maillet
Department: Geography
Category: Ecological & Environmental Sciences
Abstract: The demand for lithium has skyrocketed in recent years due to the rise of electric vehicles as a supposedly eco-friendly alternative to combustion engines. Lithium mining can produce lithium-rich runoff, potentially harming water and biota health. Northern Manitoba is rich in lithium deposits, with many residing near water bodies and Indigenous communities. This research identifies at-risk water bodies and communities and assesses lithium pollution risk based on proximity to the point source. Soil, plant, and water samples will be collected at varying distances and analyzed for lithium content. Affected communities will also be surveyed for qualitative data on water and soil health. This research is critical, as lithium pollution and its impact on water health are severely under-researched—limiting informed decisions about future mining projects.

32. **Presenter: Emily Hong**

"Review of in vitro approaches for assessing the toxicity of chemical stressors across diverse biological systems"

Supervisor: Jean-Pierre Desforges
Department: Environmental Studies and Sciences
Category: Ecological & Environmental Sciences
Abstract: The widespread presence of chemicals in the environment poses significant health risks to humans and wildlife. Existing traditional in-vivo approaches, while informative, are limited by considerable ethical, economic, and logistical challenges that prevent timely and effective chemical testing and management strategies. To overcome these challenges, new approach methodologies (NAMs) offer promising alternatives for high-throughput, mechanistic, and ethically conscious chemical toxicity testing. Key to testing chemicals for potential adverse effects is selection of appropriate bioassays that cover the range of biological or physiological pathways likely targeted by the contaminant of interest. In other words, chemical testing strategies need to cover a broad range of physiological systems to account for mechanistic specificity of contaminants. Researchers and regulators thus face the challenge of navigating this interdisciplinary and rapidly growing space. This in-depth review attempts to address this important challenge by identifying and describing existing in vitro bioassays that can be used to assess functional impacts of chemical contaminants across vital physiological systems: endocrine, immune, cardiovascular, neurological, and hepatic.

33. **Presenter: Mckenzie Gaborieau**

"Exploring Emotion Regulation Skills Use for Test Anxiety"

Supervisor: Bev Fredborg
Department: Psychology
Category: Health Sciences
Abstract: Test anxiety (TA) is a common experience for undergraduate students that can increase the risk of future anxiety and depression and reduce vulnerable students' well-being. Over the last several years, cost-effective internet-based skill modules have been developed and are increasingly used to provide needed skills to students on university campuses. This two-time point study examines the acceptability, feasibility, and effectiveness of one-time internet-based psychotherapeutic interventions (cognitive reappraisal, mindfulness, and relaxation) in reducing TA in students. We found that 63.49% of undergraduate students used the ER skill they chose at least once, either to manage test anxiety or to manage emotions outside of academic settings. As this one-time intervention directed towards TA was used, this was an easy way to help the well-being of undergraduate students.

34. **Presenter: Maleena Grewal**

"MEVs to the Rescue: Human milk has nanovesicles that can improve liver health in children"

Supervisor: Sanoji Wijenayake
Department: Biology
Category: Health Sciences
Abstract: Early life exposure to a maternal diet high in saturated fats puts infants at an increased risk for developing a condition called metabolic dysfunction-associated steatotic liver disease (MASLD). MASLD is characterized by fat buildup in liver cells (more than 5%) in the absence of alcohol abuse. MASLD in children can lead to inflammation, cirrhosis, and liver failure. One proposed early-life prevention is exclusive breastfeeding for a minimum of six months. However, the bioactive components of human milk responsible for this is unknown. Milk-derived extracellular vesicles (MEVs) are biologically active fat bubbles in milk that provide survival benefits to children. My research investigates if MEV treatment could be used to treat MASLD in infants with early life exposure to saturated fats using a tissue staining technique called histology.

35. **Presenter: Dristi Rauniyar**

"Fusion of EEG-Based Emotions with Image-Guided Medical Robots for Real-Time Operation Assistance"

Supervisor: Qian Liu & Sheela Ramanna
Department: Applied Computer Science
Category: Health Sciences
Abstract: The integration of Electroencephalogram (EEG) signals with medical robotics presents new opportunities for adaptive and emotionally aware surgical assistance. While image-guided robots have significantly improved surgical precision, they still lack responsiveness to the operator's mental and emotional state. This project aims to design an adaptive human–robot interaction system that fuses EEG-based emotional data with robotic control for real-time operation. Using the Emotiv EPOC headset, brainwave signals will be analyzed to detect levels of stress, attention, and emotional state. These cues will then guide the myBuddy280 robot's behavior during simulated surgical tasks within the ROS2 framework and 3D Slicer visualization environment. By integrating EEG-based feedback into robotic motion, this research seeks to enhance human–robot coordination, reduce fatigue, towards safer, more intuitive, and emotionally intelligent robotic assistance in medical settings.

36. **Presenter: Ardita Ibrahimaj**

"Think Outside the Body: How External Focus Keeps You Balanced"

Supervisor: Natalie Richer
Department: Applied Health & Kinesiology
Category: Health Sciences
Abstract: Directing attention externally – toward the effects of movement or a cognitive task rather than the movement itself – can enhance postural stability. We used electroencephalography (EEG) to examine how attentional focus influences postural control and brain activity while standing. Six adults (20-30 years) stood on a force platform, equipped with EEG. Participants completed four conditions: quiet standing; internal focus (minimizing ankle movement); external focus (minimizing movement of ankle markers); cognitive task (counting digits). We quantified sway amplitude, sway variability, and EEG spectral power. The external focus and cognitive task resulted in smaller medial-lateral sway variability vs. other conditions ($p<.05$). The cognitive task led to reduced sway amplitude vs. other conditions ($p<.05$). EEG spectral power was lowest in external focus and highest in cognitive task. Externalizing focus can improve postural stability, though the external focus and cognitive task seem to elicit distinct patterns of brain activity.

37. **Presenter: Jessica de Kort**

"Drawing Lines in Brains — For Science!"

Supervisor: Melanie Martin & Madison Chisolm
Department: Physics
Category: Health Sciences
Abstract: There must be a way to detect diseases earlier. Luckily, tiny parts of brain cells called axons change in size with various diseases. To figure out their sizes, we looked at highly zoomed-in images from a powerful microscope and drew lines across the axons at various angles. This helps us understand how magnetic resonance imaging (MRI), a type of brain scan, sees them. By matching our measurements to what the MRI sees, we can figure out what to adjust to the make MRI more accurate. This could help doctors detect brain conditions earlier and create better treatments such as Alzheimer's Disease and schizophrenia.

38. **Presenter: Justine Valenzuela**

"AB-Cares: Communicator Assistance through Research and Emotional Support"

Supervisor: Marcella Siqueira Cassiano
Department: Criminal Justice
Category: Social Sciences
Abstract: In 2016, the federal government called for research on operational stress injuries among public safety personnel, yet public safety communicators - 911 call-takers, dispatchers, and radio operators - were largely excluded from that agenda. This study helps fill that gap by identifying the primary resources of occupational stress among communicators in Alberta and examining how they cope with such pressures.

Using a mixed-method design, the study surveyed 219 and interviewed 77 communicators across police and fire services. Findings show that stress is driven more by individual and organizational factors than by emergency call content itself. Key stressors include understaffing, excessive workload, calls that trigger personal trauma histories, workplace gossip, and strained interpersonal dynamics.

This research offers the first empirical assessment of communicator stress in Alberta and highlights clear, actionable changes - especially in staffing, scheduling, and organizational culture - that could improve well-being and retention in emergency communications.

39. **Presenter: Camryn Lynn**

"Depression and Suicidal Ideation among 911 Dispatchers"

Supervisor: Marcella Siqueira Cassiano
Department: Criminal Justice
Category: Social Sciences
Abstract: Public safety communicators, including 911 operators and police, fire, and medical dispatchers, regularly handle traumatic calls and make critical decisions under pressure. Although not on scene, they experience stress comparable to first responders. This review summarizes 11 studies published between 1995 and 2025 on depression and suicidal thoughts in this workforce. Reported depression rates ranged from 8.4% to 73%, and suicidal thoughts were consistently higher than in the general population. Key factors include trauma exposure, shift work, emotional suppression, lack of organizational support, and past trauma. Public safety communicators face serious mental health risks, but support is limited. Stronger research, better programs and consistent workplace changes are urgently needed to reduce depression and suicidal ideation in this group.

40. **Presenter: Curie Gupta**

"Mobile Security and Privacy for Older Adults: Barriers, Behaviors, and Inclusive Support Strategies"

Supervisor: Mary Adedayo
Department: Applied Computer Science
Category: Social Sciences
Abstract: Mobile phones are increasingly essential for older adults, yet they present persistent privacy and security challenges. Age-related changes, unclear system designs, and limited digital literacy increase risks such as oversharing, weak password practices, or avoidance of security tools. This study combines a systematic literature review (41 papers), a survey of 39 older adults (mean age = 77.7), and four semi-structured interviews analyzed thematically. Results show that poor usability, inconsistent icons, and confusing permissions (not disinterest) drive unsafe behaviors. Many participants relied heavily on family for support, leaving gaps for those without such networks. Social learning, simplified designs, and clear training materials were found to empower autonomy. Future directions include usability testing, co-designed interfaces, and advocacy for age-inclusive design standards to enhance mobile security and confidence.

41. **Presenter: Victoria Goosen**

"Put that where it belongs: Versatility drives people's taxonomic and thematic organization of artifacts"

Supervisor: Brandon Goulding
Department: Psychology
Category: Social Sciences
Abstract: Deciding where things go is a part of everyday life. However, it is unclear how people make these decisions. When adults are asked to organize objects conceptually, they flexibly sort objects with things they are used with (thematically) or with things from the same category (taxonomically). Here, we explore whether children and adults flexibly use these categorical relations when judging how objects should be organized in real life. Adults (N=139) and children (N=41) judged where a character would store versatile and non-versatile objects. Adults flexibly sorted versatile objects with taxonomic matches, and non-versatile objects with thematic matches. Children's judgments followed the same pattern, but they were less flexible than adults. The findings suggest that adults and young children incorporate versatility into their real-world organizational judgments.

42. **Presenter: Erica Roberts**

"Investigating the Origins of Math Anxiety and Number Knowledge in Preschoolers"

Supervisor: Stephanie Bugden
Department: Psychology
Category: Social Sciences
Abstract: Math anxiety is prevalent among school-aged children and may begin before children enter the formal school system. This study examined whether preschoolers experience math anxiety, and its relation to their early numeracy development and their parents' math anxiety. Thirty-six 3–5-year-olds completed a new, age-appropriate math anxiety questionnaire, along with a cardinality assessment. Additionally, their parent completed a math anxiety scale. Children's math anxiety scores were significantly higher than baseline, and those with a stronger understanding of cardinality showed higher math anxiety proportion scores. No significant link was found between parent and child math anxiety. These results suggest math anxiety can emerge before formal schooling, emphasizing the need for positive early math experiences.

43. **Presenter: Gabriel Correia de Damasco Rodrigues**

"Exploring Individual Differences in Emotion Regulation Strategy Choice"

Supervisor: Bev Fredborg
Department: Psychology
Category: Social Sciences
Abstract: Emotion regulation (ER) refers to strategies people use to modify their emotional responses. Most ER research limits participants to specific strategies like distraction or cognitive reappraisal, which reduces generalizability. In this study, undergraduate participants (N = 137) completed an ER task where they previewed negative or neutral images and chose a regulation strategy in advance. Half (n = 76) were constrained to select between distraction or reappraisal, replicating prior research, while the other half could freely choose any strategy. After each trial, participants rated strategy effectiveness and completed questionnaires on typical ER use, mood, and mental health. Data analysis (to be completed by mid-November 2025) will clarify how people naturally regulate emotions, advancing understanding of real-world ER and informing interventions for emotion dysregulation.

44. **Presenter: Rhyan St. Louis**

"Reading and Language in Autism Spectrum Disorders"

Supervisor: Amy Desroches
Department: Linguistics
Category: Social Sciences
Abstract: In this study we examined reading ability and phonological processing in adults with autism spectrum disorders (ASD) compared to their neurotypical (allistic) peers. Participants performed a picture-spoken word matching task while we monitored brain responses. Match trials and three mismatch types were included – unrelated (e.g., cone-'fox'), rhyme (e.g., cone-'bone'), and cohort (e.g., cone-'comb'). We found a significant positive correlation between RAADS-R scores, which measures autistic traits, and brain responses for conditions where the initial phoneme mismatched expectations (rhyme, unrelated). This suggests that adults with higher RAADS scores may have subtle difference in how they process fine grained aspects of speech. Due to a small sample size, the results should be interpreted with caution.

45. **Presenter: Lauren Waldman**

"Disparities in Remand: Legal and Mental Health Factors Affecting Incarcerated Indigenous and Non-Indigenous Manitobans"

Supervisor: Bev Fredborg & Beverley Fehr
Department: Psychology
Category: Social Sciences
Abstract: Indigenous people in Manitoba, Canada are disproportionately overrepresented in pre-trial detention, comprising 77% of the remand population despite representing only 15% of the general population. This study investigates the role of legal representation, mental illness, and sociodemographic factors in shaping pre-trial detention outcomes for Indigenous and non-Indigenous individuals referred for Independent Medical Examinations (IMEs) at a Forensic Psychiatry Clinic in Winnipeg, Manitoba between 2017 and 2022. By comparing these factors, the present study aims to highlight systemic inequities that exist and inform culturally appropriate justice practices for Indigenous people in the Criminal Legal System in Manitoba. Preliminary data from 2021-2022 will be presented.

46. **Presenter: Genevieve White**

"Exploring Potential Predictors of Rumination: Neurodivergent Traits and Camouflaging Among University Students"

Supervisor: Lisa Sinclair & James Clark
Department: Psychology
Category: Social Sciences
Abstract: Neurodivergent individuals struggle with emotion regulation and social interactions, often using social camouflage to conceal stigmatized traits. Little is known about how subthreshold Autism Spectrum Disorder (Autism) and Attention Deficit Hyperactivity Disorder (ADHD) traits relate to rumination and camouflaging.
This study investigated how subthreshold autism and ADHD traits, and trait-camouflaging interactions, predict brooding and self-critical rumination in undergraduates (N = 99), controlling for depression. I hypothesized that both traits and trait-camouflaging interactions associate with and predict rumination. Autism traits predicted both brooding and self-critical rumination. ADHD traits were related but did not predict rumination. Trait interactions were non-significant. Findings suggest that higher subthreshold autism traits are a significant predictor of brooding and self-critical rumination in the general population. This adds to research on neurodivergent traits, camouflaging, and rumination in non-clinical populations.

47. **Presenter: Safia Soussi Gounni**

"Using Starch Analysis to Reconstruct the Consumption of Cucurbita spp. in Pre-Colonial Antilles"

Supervisor: Yadira Chinique De Armas & Mirjana Roksandic
Department: Anthropology
Category: Social Sciences
Abstract: Background: Early populations from the pre-colonial Antilles were thought to only be fisher-gatherers, however, a combination of isotope and starch analysis in human bones and dentition have proven otherwise. Although it has been determined that Cucurbita spp. was present and used in pre-colonial Antilles, there has been no confirmation through analysis of dental calculus. Objectives: Our objectives are to use starch analysis in dental calculus as well as excavated seed samples to determine the consumption of this cultigen. Methods: Sample preparation was analyzed using microscopy and compared with a reference collection. Future Directions: Radiocarbon dating and additional sample analysis must be conducted to verify our knowledge.

48. **Presenter: Cassidy Slobogian**

"Children's thinking about future times and places"

Supervisor: Brandon Goulding
Department: Psychology
Category: Social Sciences
Abstract: Future thinking involves the ability to imagine and anticipate upcoming future scenarios. Preschool children often struggle to imagine which items will be required for future use, but it is unknown which aspects of future thinking children struggle with most. We were interested in asking children about two aspects of future thinking: being in a different place or being in a different time. In the present study, we asked 3–5-year-old children (N=100) which items a character would use either "right now" and "later" (time) or "right here" and "somewhere else" (place). Children were more accurate when judging which things would be used "here" or "now" than "later" or "somewhere else". Their accuracy did not differ across time and place, and children were overall more accurate with age.

49. **Presenter: Adi Keynan**

"Mixed-Methods Study Exploring Mental Health Among a Sample of People Living with Human Immunodeficiency Virus"

Supervisor: Bev Fredborg
Department: Psychology
Category: Social Sciences
Abstract: Manitoba is experiencing unprecedented increases in human immunodeficiency virus (HIV), with rates three times the national average. Untreated HIV leads to deleterious health outcomes and greater transmission risk. While antiretroviral therapy (ART) improves outcomes and reduces transmission, adherence remains suboptimal, with reasons remaining unclear. Individuals living with HIV in Manitoba have broadly identified experiences of trauma and substance use as barriers to treatment. This mixed-methods study analyzed interviews and surveys on childhood trauma and empowerment from 32 Manitoba HIV Program participants. Thematic analysis revealed four themes: experiences of hardship, substance use coping, resilience, and empowerment. Despite these challenges, participants demonstrated resilience through health-promoting behaviors. Participants highlighted the need for increased support addressing social determinants of health including, addiction, housing, and trauma. Findings underscore the importance of trauma-informed, evidence-based interventions.

50. **Presenter: Steven Axelrod**

"Pilot Study: Anxiety and Costly Avoidance"

Supervisor: Doug Williams & Erin Buckels
Department: Psychology
Category: Social Sciences
Abstract: This pilot study examined how individuals make cost-based decisions when avoidance carries a price. Participants completed anxiety and personality questionnaires and an online Approach–Avoidance Conflict Task, in which choosing aversive images sometimes yielded increasing or uncertain ("??") point rewards. Participants approached aversive images more often as rewards increased, and behaviour on "??" trials fell between low and high reward conditions, indicating sensitivity to both cost and uncertainty. These findings confirm the task's ability to model costly avoidance and decision-making under ambiguity. Future research with a larger sample will test whether Intolerance of Uncertainty (IU) and related anxiety traits predict these behavioural patterns, informing efforts to understand avoidance in contexts such as medical or exposure-related situations.

51. **Presenter: Mary Ajayi**

"From Relational Sexism to Depression: The Role of Ruminative Thinking"

Supervisor: Lisa Sinclair
Department: Social Science
Category: Social Sciences
Abstract: Sexism harms mental health, yet its effects within close relationships are less understood. This study tested whether relational expressions of negative and seemingly positive sexism predict depression through ruminative thinking as an underlying process. Drawing on Ambivalent Sexism Theory (Glick & Fiske, 1996), we examined Heterosexual Hostility (HHOS)—sexualized entitlement and resentment—and Heterosexual Intimacy (HINT)—controlling affection disguised as care.

Undergraduate women completed measures of sexist experiences, personal rumination on unwanted experiences (PRUE), brooding rumination, and depression. Mediation analyses supported the pathway from sexism → PRUE → brooding →depression for both HHOS and HINT.

Findings suggest that both hostile and seemingly benevolent forms of relational sexism contribute to depression through maladaptive rumination. Interventions that reduce rumination may help lessen the psychological burden of everyday sexism.

52. **Presenter: Olivia Shyiak**

"The development of beliefs about pretend possibilities"

Supervisor: Brandon Goulding
Department: Psychology
Category: Social Sciences
Abstract: Children often judge that improbable events, like drinking onion juice, are impossible in real life. They are even skeptical that these events can happen in dreams and stories (Goulding & Friedman, 2020). Here, we explore whether 4-6-year-olds (N=51) think people can pretend to do unlikely things. While children's pretense is usually grounded in their real-world experience (Harris et al., 2021), their first-hand experience with pretend play may lead them to view pretense as less constrained than reality. We found that children more often affirmed improbable events when asked if a person could pretend to do them than actually do them. However, they only affirmed pretend events if they first denied real ones. The findings suggest that children see more possibilities in fantasy if they first ground themselves in reality.