



Inquiry@Queen's

9th

Annual Undergraduate Research Conference

Program

March 5 & 6, 2015
Queen's Learning Commons
Stauffer Library

iatq.ca

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March 2015

We are now in our 9th year of celebrating the discoveries of a new generation of scholars at the Annual Inquiry@Queen's Undergraduate Research Conference. We have two full days to share, discuss, think, learn and feel excited about the research of our undergraduate students. The work they will present comes from many avenues - course work, theses, design projects and summer research opportunities; some came simply from an interest in a topic, and a desire to know more and think more.

Inquiry@Queen's is more than a conference; it is an approach to learning where the teacher and the learner reside in the same person. It is a natural extension of a university that prides itself on the quality of undergraduate education and its scholarship and research.

We invite you to attend the oral presentations, to view the posters and talk to the presenters, to ask questions, to attend the opening ceremonies and the special events, but most certainly to enjoy the breadth of undergraduate student scholarship. Drop by for an hour, an afternoon, a day or two days!

We thank all those who have supported us over the past seven years. Congratulations to all participants!

On behalf of the Inquiry@Queen's Steering Committee,

Co-Chair, Nathalie Soini
Acting Head, Learning & Research Services
Coordinator, QLC
Queen's University Library

Co-Chair, Vicki Remenda
Queen's Chair in Teaching and
Learning, 2006-09
Acting Head, Geological Sciences
and Geological Engineering

Co-Coordinator, Patrick Patterson
QLC Assistant
Queen's University Library

CONFERENCE AGENDA

Thursday, March 5, 2015

CONFERENCE AGENDA
Friday, March 7, 2014

ORAL PRESENTATIONS

Session I: Health, Wealth, and Water

Speaker's Corner, Queen's Learning Commons, Stauffer Library

Thursday, March 5, 8:40-10:00

Moderator:

The Cost of the First World War to the United States

Presenter: Kristen Tannas, Economics

Faculty Supporter: Frank Lewis

In this paper, a calculation of cost of the First World War to the United States is performed with the aim of evaluating the impact of the War on the American economy. The method used to make this calculation is based on the work of economic historians Claudia Goldin and Frank Lewis, who studied the cost of the American Civil War. This method involves the calculation first of the "direct cost" of the war, which represents the value of economic losses made up of war expenditures, casualties and the opportunity cost of drafted soldiers. The "indirect cost" of the War is also calculated to measure the impact of the War on American economic growth by projecting economic growth in a hypothetical world where the First World War did not occur and comparing it to the economic growth actually experienced in the United States. This calculation is meant to capture any positive effects that the War may have had. For the calculations, data was drawn from a number of primary sources including censuses and government documents. The results of both of these calculations show that the First World War had a negative impact on American growth and represented a massive drain of economic resources. In particular, the indirect cost calculation shows that American growth slowed considerably in the decade following the War. This result is significant as it contradicts the common view of the postwar period prior to the Great Depression as being one of great prosperity in the United States.

A Study of the Effect of Central Bank Intervention on North American Debt Financial Markets

Presenter: Evan Burns, Economics

Faculty Supporter: Professor Allen Gregory

This presentation, and corresponding research paper, serves to analyze the impact of Central Bank policy and operations on financial markets in the United States and Canada during the period of Summer 2008 to present day.

Research is primarily focused on the effects of monetary stimulus and the setting of Central Bank policy rates and how these two tools impacted the market for fixed income financial instruments.

The presentation analyzes the decisions made by borrowers of capital, primarily institutions and governments, given the unprecedented macroeconomic environment experienced during this period.

To complement this research and provide a thorough analysis of the effects of Central Bank policy, the presentation analyzes other asset classes and provides insight into the impact of Canadian and U.S.

Central Bank actions globally.

In doing this, the presentation will provide a more complete picture of how Central Bank actions during this period impacted not only North American economies but also the effects experienced by investors across geopolitical and asset class divisions.

Problematizing the Privatization of Water

Presenter: Samantha Gamero, Political Studies and Philosophy

Faculty Supporter: Dr. Jacqueline Davies

This presentation will focus on the issue of the privatization of water. The privatization of water is currently being facilitated by the growth of trade liberalization and the free trade policies of international organizations like the IMF and World Bank. It is also growing due to the neoliberal policies of states and because of the increasing power of the private sector (including well-funded lobby and special interest groups) over the policies of governments. The principal arguments and viewpoints of those who both support and oppose the privatization of water will be examined and evaluated. In particular, arguments concerning the cost and accessibility of water for people will be studied. The effects and implications of privatization in highly diverse communities in both developed and developing countries will be discussed. An example from the community of Cochabamba in Bolivia will be analyzed, showing many of the drawbacks that can come with the privatization of water. This presentation will argue that water is a precious resource which ought not to be treated as a commodity. Instead, it should be treated as a human right that no individual or corporation should make a monetary profit from. Governments ought to provide safe drinking water for their citizens, rather than leaving this duty to the private sector as is happening in many parts of the world.

The First Wealth is Health: Assessing the World Health Organization's Impact on a High African Disease Burden

Presenter: Kiran Waterhouse

Underdeveloped regions of the world are plagued by a high prevalence of communicable diseases. Their deleterious effects on the quality of human life in such areas are clearly observable, making this a phenomenon worthy of sustained investigation. While no single factor determines the success or failure of development in a region, social scientists have attributed a measurable reduction in development capabilities to the enormously suppressive economic, social and psychological burdens of these communicable diseases. The institution of the World Health Organization, an agency of the United Nations, exists with a mandate to mitigate the harms of high disease burdens upon afflicted populations. In this paper, I evaluate the efficacy of the World Health Organization (WHO)'s work combating communicable diseases in Sub-Saharan Africa through an examination of its liberal methodology. To do so, I examine the mandate and methods of the World Health Organization with the aim of comprehending how its institutional features successfully promote consensus building and collaboration between domestic and international actors. I conclude that the WHO's success stems from its entrenched philosophy of liberalism, an international relations perspective focused on creating cooperative ties between international actors. This finding is significant because it provides insight into how the social nature of communicable diseases makes international cooperation within all relevant political levels of analysis an indispensable component of disease management strategies.

Session II: Oh, the Humanities!

Stauffer Library 121, Queen's Learning Commons, Stauffer Library

Thursday, March 5, 8:40-10:00

Moderator:

Is Change Essential To Time?

Presenter: Brittany Moore

There has been debate between A-theorists and B-theorists concerning the nature of time. The A-theory presents time as moving itself and that every moment passes from past, to present, and then to future. In short, in A-theory, time itself passes. The B-theory, on the other hand, says that all moments are equally present and that there is only past and future. In the B-theory of time, time itself doesn't move, but according to the B-theorist, there is plenty of change within time. Looking at the famous Gottfried Wilhelm Leibniz and Samuel Clarke (Isaac Newton's representative) debate, Correspondence, this paper addresses the opinions surrounding space, time, and change. If Leibniz is correct in proposing that space is what occurs between objects – thus defending the relational theory of space called relationism – then it can be assumed that change is essential to time. In the end, it can be assumed that if there were to be no objects left in the universe, space would no longer exist. If space or objects did not exist, then there would be no change. Conclusively, if there were no change, time would cease to exist.

Huis Clos: La Signification de "L'Enfer c'est les autres"

Presenter: Neal Dawan, French Studies

Faculty Supporter: Elodie Vignon

“L'Enfer c'est les Autres” s'avère être une expression appropriée pour définir la cinquième scène de la pièce de théâtre Huis Clos, écrite par Jean-Paul Sartre. Écrivain existentialiste du début du vingtième siècle, Sartre a publié cette pièce en 1944 pour illustrer la vie après la mort de trois défunts qui sont piégés ensemble en enfer pour l'éternité.

Je propose de présenter l'analyse littéraire de cette scène à partir de la comparaison entre des êtres humains et l'enfer, et le lien qu'il existe entre les deux du point de vue de l'auteur.

Je vais tout d'abord me concentrer sur les indices du texte qui dévoilent le cadre de cette scène, et je mettrai notamment l'accent sur une conversation qui se déroule entre deux des personnages présents sur scène: le personnage masculin qui s'appelle Garcin, et le personnage féminin qui se prénomme Inès. Ensuite, j'examinerai alors le conflit qui oppose les deux personnages et, notamment, la réaction de Garcin en réponse aux insultes d'Inès. Finalement, j'étudierai encore plus précisément la réplique la plus connue de la pièce, c'est-à-dire « L'enfer, c'est les Autres », et la raison pour laquelle Garcin arrive à cette conclusion.

L'éternité de la maternité : une analyse de la relation mère-fille dans *Tout comme elle* de Louise Dupré

Presenters: Rachel Albert, Michelle Hudon, Sadie Vanier, French

Faculty Supporter: Elodie Vignon

La relation mère-fille est une relation unique et universelle. C'est une relation qui évoque à la fois deux femmes individuelles et met en lumière des éléments positifs et négatifs, éléments qui permettent aussi de réfléchir à ce que c'est que d'être une femme.

La pièce de théâtre *Tout comme elle* de Louise Dupré, publiée en 2006, remet en question les valeurs féminines et maternelles. Celle-ci nous emporte notamment dans le domaine de la douleur et de l'universalité de la féminité, ce que nous analyserons à partir des actes III et IV de la pièce. Ces derniers nous encouragent à poser la question suivante, à savoir comment la relation mère-fille fait preuve de permanence, malgré les obstacles qu'elle peut rencontrer.

Nous répondrons à cette question en explorant la fonction de la distance, ce qui nous renverra alors à l'idée de la totalité du temps. Enfin, nous monterons comment cette pièce valorise le cycle de la féminité. En effet, ce sont les mères et les filles qui rendent possible la survie des êtres humains. Et cette présentation montrera par conséquent l'aspect éternel de la relation mère-fille à travers cette œuvre québécoise.

Panorama de la poésie québécoise/Panorama of Québécoise Poetry

Presenter: Jacob Miller, Linguistics

Faculty Supporter: Professor Élodie Vignon

L'essor de la production poétique au Québec s'avère parfois difficile pour certains d'y aborder, le public autrefois intéressé se laissant impressionner par son évolution accélérée ; mais, en connaissant la place qu'occupe la poésie québécoise dans l'histoire, on apprécie mieux les poètes et leur poésie. L'histoire de la poésie québécoise se déroule selon des étapes bien distinctes jusqu'à nos jours et c'est surtout l'histoire selon Jean Royer qui donne un aperçu de l'ensemble des voix et des œuvres marquantes. Le présent discours n'a d'autre but que de commenter l'itinéraire de la poésie québécoise, à partir duquel le goût personnel pourrait enfin se prendre.

The surge of poetic production in Quebec sometimes proves difficult to get into, the otherwise interested public intimidated by its rapid evolution; yet, by learning the place that Québécoise poetry holds in history, one comes to better appreciate the poets and their poetry. The history of Québécoise poetry unfolds by rather distinct stages from its origins up till now and its history overall, according to Jean Royer, which gives insight into the group of voices and vital works. The present talk has no other aim but to discuss the path that Québécoise poetry has led, whence personal taste can finally take off.

10:00 to 10:10 Break

10:10 to 11:00 – Keynote Speaker – Peter Wolf, Director of the Centre for Teaching and Learning, Speaker's Corner

Session III: Myth-Making Part 1

Speaker's Corner, Queen's Learning Commons, Stauffer Library

Thursday, March 5, 11:00-12:30

Moderator:

Social Reform with a Nationalist Agenda: The Sarda Act of 1929

Presenter: Hayley McNorton, History/Political Studies

Faculty Supporter: Ishita Pande

On September 20th 1929, the Indian Central Legislative Assembly passed the Sarda Act. The Sarda Act was the result of ongoing discussions in India in the early twentieth century that revolved around the age of consent and the age of marriage. Har Bilas Sarda, a member of the Assembly since 1924, introduced the bill in 1927 as the Child Marriage Restraint Act. In history, this bill is celebrated for improving the

living conditions for women in Colonial India by addressing the potentially negative physical and social effects that having sex and giving birth could have on young girls. However, what is not discussed in history is the motivations that Har Bilas Sarada had in introducing the bill. Using primary sources, I would like to argue that the Sarada Act was part of a larger nationalist agenda espoused by a Hindu nationalist group called the Arya Samaj which aimed to restore the legacy of the ancient Hindu civilization. I will conclude by linking the themes in Sarada's writings with the broader historical context to demonstrate that that Sarada's motivations for campaigning for a higher age of marriage was tied to a Hindu nationalist agenda.

The Stories we Tell Ourselves: The Horatio Alger Myth, American Influence and their Consequences

Presenter: Colin Zarzour, Political Studies

The stories that we see, hear, and consume each and every day shape the way we understand and store our lived experiences. One of the most dominant stories we are fed is that of a disadvantaged individual moving from rags to riches. Globalization spreads this American narrative across the world, in the form of movies, TV shows, books, and much more. Humans utilize narratives as a way of storing information about our experiences as well as paradigms through which we understand those experiences. The American rags to riches narrative ingratiates itself in the minds of people across the globe, constructing a hegemonic system of beliefs that inequality is natural, disadvantages are essential, hard work will save you, and that the only barrier to success is you. These are false beliefs. A case example of Major League Baseball's practices in the Dominican Republic support this analysis. Only when this relationship is exposed can citizens suffering from structural inequality truly acknowledge the forces working against them, and begin writing a new version of their story.

Why History Should be Perceived Transnationally

Presenter: Sandra Klos, History

Even though the concept of nationhood is a fairly recent and Western idea, it has left its mark not only on history itself, but on the way we are able to think, understand, and teach history. I have chosen a specific topic in German history, the stab-in-the-back legend of the First World War, which traditionally has always been conceptualized as a mere German discourse. Through an analysis of French newspapers, however, I was able to show that the myth of a never militarily defeated German army had meaning and consequences not only for German domestic politics, but transgressed national borders. It was a provocation well noted abroad, a journalistic tool to criticize French foreign politics, and an increasingly important influence of the war memorial in interwar France. This study revealed transnational aspects of history that are commonly overlooked when working within national frameworks. While history textbooks one hundred years later emphasize the great impact of the stab-in-the-back legend for German mentalities, we limit our views to national boundaries, and fail to acknowledge the impact of a globalized media industry. Not only was the German legend familiar to large parts of the French public, it also served as a historical site where the French national identity was formed against the backdrop the German "other." The legend's discourse thus perpetuated war images that legitimized French war efforts and losses. Hence, a transnational perspective of history does not negate the concept of nation, but transcends it.

Politics and Religion in the Third Crusade: Examining the Rise of Political Motives on Crusade through the Plantagenet-Capetian Rivalry through 1190 to 1193

Presenter: Darren Henry-Noel, History

In 1095CE hundreds of Frankish warriors, filled with religious fervor, gathered at Clermont in France to hear a sermon by Pope Urban II. In it, the pontiff laid out a grand mission, to reclaim Jerusalem from the forces of Islam and restore it once again to the stewardship of Christianity. The expedition that followed would be known as the First Crusade and led to nearly two centuries of sustained military, economic, and societal presence by European Christians in the Levant. My research project focuses on the Third Crusade of 1190-1193CE, which was launched in response to the fall of Jerusalem to Saladin, Sultan of Egypt and Syria, in 1187CE. My research asserts that the Third Crusade was a turning point in the development of crusading ideology. My work argues that this expedition began a process whereby crusading evolved into a tool for achieving the political goals of its secular leaders, as opposed to an act of religious penitence. This involves a close analysis of the principal leaders of the crusade, Richard I of England (r.1189-1199) and Philip II of France (r.1180-1223), and places their actions on crusade within the wider context of their rivalry to achieve political dominance in Western France. Given the integral part crusading played in the notion of medieval kingship, and taking into account growing monarchical participation in crusades, I also hope to connect the two concepts of royal power and crusading ideology as they were being solidified in the late twelfth century.

Session IV: Visualizing Research Part 1

Seminar Room, Queen's Learning Commons, Stauffer Library

Thursday, March 5, 11:00-12:30

Moderator:

A New Method for Change Detection in Stone and Concrete Structures with Digital Photogrammetry

Presenter: Kristen Jones, Classical Studies

Faculty Supporter: Dr. George Bevan

Point clouds, generated by Photogrammetry and LiDAR, allow us to detect far more complex deformation processes, with greater speed and accuracy, than previous surveying techniques. The accuracy of any monitoring is determined, in part, by the method used to align the two epochs in the same space. Surveying equipment can be used to stake-out ground control points visible in either the laser scan or the photogrammetry and so provide absolute positioning for each epoch. As an alternative, 3D shape-matching algorithms like RANSAC and Iterative Closest Point (ICP) can be used downstream to align the two epochs based only on the invariant features visible in the dense clouds. Shape-matching is, however, limited in accuracy because a) operator proficiency in guiding the algorithms leaves room for error, and b) the point clouds used for alignment are usually insufficiently dense to guarantee sub-centimeter change detection. Proposed is a new method of alignment between monitoring epochs for photogrammetry. Photogrammetry has the ability to match features between images down to the accuracy of 0.15 pixels, and provides us with a robust statistical model to predict both accuracy and error. Using invariant features in photographs shared between monitoring epochs, we can use the algorithms of Normalized Cross Correlation and Least-Squares Matching to very accurately "pin" one monitoring epoch to another. In a series of simple experiments we demonstrate that sub-centimeter change detection is easily accomplished on highly textured surfaces such as stone and concrete. This has applications in Archaeology, Architecture, and Civil Engineering surveys.

Open Source Software Implementation of Anatomical Segmentation

Presenter: Maggie Hess, Life Sciences

Faculty Supporter: Gabor Fichtinger

Purpose: Intraventricular hemorrhage (IVH) affects nearly 15% of preterm infants. It can lead to ventricular dilation and cognitive impairment. To ablate IVH clots, MR-guided focused ultrasound surgery (MRgFUS) is investigated. This procedure requires accurate, fast and consistent quantification of ventricle and clot volumes.

Methods: We developed a semi-autonomous segmentation (SAS) algorithm for measuring changes in the ventricle and clot volumes. Images are normalized, and then ventricle and clot masks are registered to the images. Voxels of the registered masks and voxels obtained by thresholding the normalized images are used as seed points for competitive region growing, which provides the final segmentation. The user selects the areas of interest for correspondence after thresholding and these selections are the final seeds for region growing. SAS was evaluated on an IVH porcine model.

Results: SAS was compared to ground truth manual segmentation (MS) for accuracy, efficiency, and consistency. Accuracy was determined by comparing clot and ventricle volumes produced by SAS and MS. In Two-One-Sided Test, SAS and MS were found to be significantly equivalent ($p < 0.01$). SAS on average was found to be 15 times faster than MS ($p < 0.01$). Consistency was determined by repeated segmentation of the same image by both SAS and manual methods, SAS being significantly more consistent than MS ($p < 0.05$).

Conclusion: SAS is a viable method to quantify the IVH clot and the lateral brain ventricles and it is serving in a large- scale porcine study of MRgFUS treatment of IVH clot lysis.

Developing a Model to Study Commensal Translocation during IBD

Presenter: Kathy Yu, Life Science

Inflammatory bowel diseases (IBD) is severe inflammation of the gastrointestinal tract. This can lead to a breakdown of mucosal barriers, causing dissemination of commensal bacteria throughout the body. To better understand bacterial translocation during IBD, aim to develop a fluorescent microbiota in mice that we can interrogate using live imaging techniques.

Our preliminary experiments depleted commensals using broad-spectrum antibiotics, and replaced these microbiota with a fluorescent E. coli strain. The length of time that E.coli stays in the mice gut were monitored. We show that E. coli can persist in the 'germ-free' mouse gut for at least 21 days; control mice lose all added E. coli by 8-14 days. The establishment of the E. coli colony suggests this could be a reasonable model to study bacterial translocation. We are currently going to treat the colonized mice with DSS to induce colitis, and then to study translocation of E. coli by intravital microscopy. Considering E. coli is only a fraction of the normal microbiota and perhaps not a relevant model, future work aims at making a fluorescent microbiota consisting of multiple endogenous murine microbes. This will entail the use of a bacterial conjugation system capable of ubiquitously transforming many microbial species.

Disordered Photonic Crystal Slabs for Thin-Film Photovoltaics

Presenter: Chelsea Carlson, Engineering Physics

Faculty Supporter: Dr. Stephen Hughes

Photonic crystal nanostructures are the foundation for many optical applications such as nanochip waveguides, optical fibres, and high-Q nanocavities. Recently, researchers have begun to explore the use of photonic crystal slabs to increase the overall absorption of sunlight in thin-film solar photovoltaic (PV) cells. Currently, amorphous silicon (a-Si:H) thin-film technologies can only achieve efficiencies of up to 16% in laboratories and less than 10% in manufactured commercial products. The difficulty in improving these efficiencies arises from the inherent band gap properties of the crystalline silicon layer: the natural photonic bandgap in the near infrared (IR) region of light prohibits almost a third of the entire available solar spectrum from being absorbed. Some of this loss can be salvaged by increasing the thickness of the silicon layer, but this drives the price of the cell up and has very limited potential. However, using photonic crystal nanostructures in the active layer of the cell can decrease the reflection of light at the surface and increase the photon path within the film, enhancing the collection and conversion efficiencies over a broad spectrum. The absorption can be further increased by introducing pseudo-disorder within the structures. The purpose of this study was to explore the physical parameters of this disorder and quantitatively optimize absorption.

Session V: Myth-Making Part 2

Speaker's Corner, Queen's Learning Commons, Stauffer Library

Thursday, March 5, 1:30 -3:00

Moderator:

The Building Blocks of Defensive and Accusatory Language in Canadian Question Period

Presenter: Emily Blyth, Linguistics

Faculty Supporter: Prof. Greg Lessard

The idea that there are grammatical structures which form accusations and defenses in language has been explored in the context of isolated instances of political debate (Rasiah 2009). This paper goes beyond that, looking at the specific linguistic strategies that compose such a structure, and evaluating those strategies over time. A discourse analysis is used to isolate, contrast and compare argumentative strategies in two different sections from the Canadian Hansard corpus. The first section consists of transcriptions of question period recorded in 2005 while the second is from 2014, allowing for a comparison that explores these trends through time. The strategies found in each section consist of specific linguistic elements which are relevant in the context of grammar structure analysis. Beyond this the individual strategies can also be sorted into larger groups, such as temporal distancing and diverting agentivity, which map the grammar of evasion on a more general scale. These groups expose language trends in political debate, and allow for an analysis of general evasion tactics used in Canadian government. By exploring the implications of said trends, this paper raises the question of political integrity in our Country's leadership. A presentation of this thesis would explore the specific strategies, however would focus on the general groups, the trends that they expose and their implications. This information could be found relevant in many academic contexts including sociolinguistics, applied linguistics, politics, and English studies.

Knowledge of the Mass Murder of Jewish People Possessed by Ordinary German People

Presenter: Gillian Yijing Liu, Arts & Science

Faculty Supporter: Mark Crosswell

In 1933, the Nazi Party, led by Adolf Hitler, came to political power in Germany. As a direct result of the Nazi's actions, approximately 6 million Jewish victims were killed. The Nazi Party members were undoubtedly responsible for these results, but were the non-party Germans? To answer this sensitive question, the extent of knowledge of these events must be investigated. To what extent did "ordinary" German civilians know about the extermination of Jews during the Holocaust in Berlin from 1942 to the end of the Second World War? The population must be categorized by those who knew about the Jewish deportations and murders, those who chose to know, those who chose not to know, and those who did not know.

To investigate this idea, oral interviews were collected. They hold value as a first hand perspective, but have limitations of dishonesty and censorship of information. A large collection of survey information from 1985 was heavily considered, in addition to various secondary sources such as articles, videos, and books, and primary sources such as maps and photographs.

After weighing probable statistics and popularity of Nazi ideology, evidence supports the idea that more Germans chose not to know about the extermination of Jews than any other extent, due to the high number of Nazi ideology supporters, high degree of terror propaganda, and indoctrinated youth.

When Conventionality isn't Enough: Three-year-olds Overimitation of Action Sequences

Presenter: Kathleen Merwin, Psychology

Faculty Supporter: Dr. Valerie Kuhlmeier

Imitation is a universal social learning mechanism. Children are so prone to imitation that they occasionally exhibit "overimitation" – imitation of actions that are superfluous to achieving a goal. One explanation for overimitation is that children believe that there is something causal about these actions. An alternative explanation is that children believe the superfluous actions reflect conventions. The first study addresses these possibilities by investigating whether the conventionality of actions affects children's overimitation. We reasoned that if children believe that the actor's superfluous actions are causal, they might overimitate anytime those intentional actions precede the achievement of a goal. However, if children are more concerned about conventional ways of doing things, they might only overimitate superfluous actions when they are being presented as conventions. Participants were allowed to use a novel toy machine after a model performed causally relevant and superfluous actions on the toy. Results suggested that children overimitated more when the model was knowledgeable about the toy machine. This suggests that children do not simply overimitate any intentional actions that precede a goal. Instead, they selectively overimitate when there is evidence that those actions are conventional. The second study examined whether children would overimitate superfluous actions performed after the achievement of a goal. If children view all actions of a knowledgeable model as conventions and view the superfluous actions of an ignorant model as exploratory, they will overimitate more in the knowledgeable condition. Results suggest that children do not significantly overimitate the superfluous actions performed subsequent to goal achievement.

Session VI: Visualizing Research Part 2

Stauffer Library 121, Queen's Learning Commons, Stauffer Library

Thursday, March 5, 1:30-3:00

Moderator:

Portable Tracked Ultrasound System to Monitor Spinal Curvature

Presenter: Maggie Hess, Life Science

Faculty Supporter: Gabor Fichtinger

Introduction: Adolescent idiopathic scoliosis (AIS) is the most frequent spinal deformation. It is assessed by frequent x-ray imaging, exposing patients to frequent radiation, increasing the risk of cancer. Tracked ultrasound imaging produce a three-dimensional visual of the spine without risk. We proposed using an optically tracked handheld USB Interson ultrasound probe, which is much less expensive than the current standard ultrasounds.

Methods: A practical setup was developed for scoliosis monitoring. Reference markers were on the patient's shoulder and the wall to account for patient motion, and simulate the plane of the x-ray detector to allow future comparisons. The optical tracker tracked the markers and ultrasound probe. This was compared to the electromagnetically tracked non-portable Ultrasonix ultrasound. Scanning captured the thoracic and lumbar regions. A three-dimensional image was composited by stacking a series of two-dimensional ultrasound slices in their tracked physical positions. To compare the two-ultrasound setups and ensure the ease of identification, a novice attempted to manually identify transverse processes. These were compared to see if all transverse processes scanned could be marked from both ultrasound setups. Two clinical experts then confirmed the markings were anatomically correct.

Results and Conclusions: In all scans 100% of the transverse processes scanned ($n = 51$) were identified in Interson and Ultrasonix images. Curvatures measured using the Ultrasonix method have been previously validated to curvature measurements from x-ray images. Thus the 100% correspondence of the Interson and Ultrasonix setups indicates this inexpensive method is a promising tool to reduce radiation exposure during scoliosis monitoring.

Searching for Dark Matter: Background Discrimination in the PICO detector

Presenter: Stephaney Daley, Engineering Physics

The PICO experiment uses superheated bubble chambers located at SNOLAB for direct detection of Weakly Interacting Massive Particles (WIMPs), one of the candidate particles for dark matter. Bubbles form in the detector when a particle interacts with a nucleus of the target fluid, and the recoiling deposits enough energy to nucleate a bubble in the superheated fluid.

Much of the data analysis for PICO focuses on determining what type of particle caused a bubble to form. The differentiation is made by analysing signals from pressure sensors, piezoelectric acoustic sensors, and stereoscopic cameras. This talk will present an overview of the sensors and analysis which are used to discriminate between WIMP interactions and background events in the PICO 2L detector, with a focus on the role of image analysis and the potential sensitivity of the detector if good discrimination can be realized.

A System for Visualizing and Assessing Electromagnetic Tracking Error during Computer-assisted Surgery

Presenter: Vinyas Harish, Biomedical Computing

Faculty Supporter: Dr. Gabor Fichtinger

PURPOSE: Electromagnetic tracking is used in image-guided interventions to monitor the position of surgical equipment. However, it is prone to error. During navigation procedures, the measurement and visualization of error should take place to ensure precision and accuracy. Our goal was to extend open-source software such that no programming from the user is needed for error monitoring.

METHODS: The electromagnetic tracking error was defined as the difference in position readings of a surgical stylus that was optically and electromagnetically tracked. The optical tracking reading was considered ground truth as it is unaffected by metal objects. The stylus was moved freehandedly within a region of interest to quickly sample electromagnetic tracking error, including error caused by field-distortion inducing ferromagnetic materials and random noise. All tracked devices were used in a plug-and-play manner. Measurements were visualized in real-time in 3D Slicer, an open-source platform for medical image computing (www.slicer.org).

RESULTS: To determine the reproducibility of the data collected by our system, the tracking error was measured in regions of interest representing a surgeon's workspace. Tests were done with and without metal objects placed in the workspace. A quick freehand sampling procedure was sufficient to detect error. Freehand measurements within a controlled environment reported distortion values of 1.16 mm (STD 0.71 mm). Measurements taken with a metal rod and parts from a surgical retractor kit were 4.27 mm (STD 2.92 mm) and 8.26 mm (STD 2.08 mm), respectively.

CONCLUSION: Our system shows promise for the real-time visualization of electromagnetic tracking error during computer-assisted surgical procedures.

Examining the Validity and Utility of Two New Measurement Devices in Sexual Psychophysiology Research

Presenter: Amanda Shelley, Psychology

Background: Female genital arousal is an important, yet difficult phenomenon to measure.

The Laser Doppler Imager (LDI) and the Litmus Test Strip (LTS) are new measurement devices for assessing vulvar blood flow and vaginal lubrication, respectively. Given their recent development, few studies have used these measures, and further testing of their validity is needed. Using both devices concurrently provides an opportunity to demonstrate convergent validity (i.e., a significant, positive correlation) between these measures. Investigation of the utility of these devices—such as their sensitivity to varying intensity of sexual arousal—is also needed. Measures that can detect intensity of genital arousal allow researchers to study more complex questions than measures that only indicate the presence or absence of it.

Method: Sexual arousal will be induced using erotic videos depicting foreplay and penile-vaginal intercourse. Vulvar blood flow and vaginal lubrication will be assessed using the LDI and the LTS. Participants will self-report their experience of sexual arousal.

Hypotheses: I predict that:

1. Changes in vulvar blood flow (as measured by LDI) and vaginal lubrication (as measured by LTS) will be positively correlated with self-reported sexual arousal;
2. Changes in vulvar blood flow and vaginal lubrication will be positively correlated with each other;
3. Vulvar blood flow and vaginal lubrication will vary according to intensity of sexual response.

Results: Data collection in progress. Results will be available at the time of the presentation.

Implications: Further development of two new measurement devices for sexual psychophysiology research.

3:00 – 3:15 Break

Session VII: Accelerating Change: Arctic to the Amazon

Speaker's Corner, Queen's Learning Commons, Stauffer Library

Thursday, March 5, 3:15 – 4:30

Moderator:

The Effects of Predicted Soil Moisture and Temperature Increase on CO₂ Exchange within a High Arctic Ecosystem

Presenter: Sarah Jackson, Geography

Faculty Supporter: Neal Scott

With 2014 being the warmest year on record and 10 of the warmest years occurring after 1997, it is essential to understand the effects of this warming on CO₂ exchange. It was also discovered that much of this warming is focused in the Arctic regions, which are sensitive to changes in temperature (Cole & McCarthy, 2015). My research examines the effects of enhanced snowfall and soil temperature on the exchange of CO₂ between the land and the atmosphere in a high arctic environment. The research is taking place at Cape Bounty Arctic Watershed Observatory (CBAWO) on Melville Island, Nunavut as part of the International Tundra Experiment (ITEX). The goal of ITEX is to better understand the effects of increased summer temperature and increased snowfall on arctic ecosystems. This is a full factorial experiment including treatments varying precipitation (and likely soil moisture), soil temperature, moisture and temperature together, and a control that is at ambient soil moisture and temperature. Snow fences are used to enhance precipitation, while open-topped transparent chambers are used to increase soil temperature. In a companion lab experiment, I look at the effects of different soil moisture levels and temperatures on soil CO₂ production in a more controlled environment. Two temperatures, two moisture levels, and eight replicates of each will be established in sealed incubation chambers, and soils will be incubated for 33 days. Presently a significant relationship has been found between soil moisture and CO₂ flux within the field experiment.

Arctic Plant Responses to Climate Warming: It's Not all about Nitrogen

Presenter: Sanna Masud

Faculty Supporter: Dr. Paul Grogan

Climate change is increasing air and soil temperatures in the Arctic, likely enhancing microbial activity. Consequently, increased decomposition rates of soil organic matter and increasing nutrient supply to tundra vegetation can be expected. The impacts of experimental warming and fertilization on growth have been investigated by studying the availability of macronutrients such as N, P and C. However, other

macronutrients such as S, Ca, Mg, K, and micronutrients such as Fe, Mn, Cu, and Zn have received little research attention to determine their function, biogeochemical cycling, and effect on vegetation growth in response to warming. This study investigated the impact of experimental warming responses on availability and accumulation of the latter nutrients in the principal plant species located in mesic birch hummock tundra near Daring Lake, Northwest Territories in the Canadian Low Arctic Tundra. Plants were sampled in 2011 from the replicated summer greenhouse treatment that was established in 2004.

In response to warming, the principal evergreen shrub (Rhododendron) had the most enhanced growth, followed by the deciduous shrub (Birch). Since the total plant pools of these nutrients were also enhanced in the evergreen, my results strongly suggest that availability of these nutrients was not limiting growth. By contrast, the birch total plant nutrient pools were not enhanced and significant decreases in Mg, S, and K leaf concentrations were observed, suggesting that these elements may be limiting birch growth. Together, our results suggest that plant growth response to climate change in the low Arctic may depend on previously overlooked nutrient elements, and that deciduous shrub growth may be constrained relative to the evergreen response as the arctic climate warms.

How Climate Change Affects the Amazon Rainforest

Presenter: Tegan McWhirter and Lisa Leung, Environmental Science

Faculty Supporter: Dr. Adrien Djomo

Climate change has a drastic impact on the structure and behavior of the amazon. Short-term effects of climate change are gradually creating more long-term effects that can be witnessed globally. Due to increased temperature, decreased precipitation and increased greenhouse gases, the amazon faces hazardous events such as droughts, forest fires, floods and vegetation differences. All of these events contribute to larger scale impacts on the amazon such as a major loss of biodiversity, and ultimately Amazon dieback. Forest feedback loops present the issue of how the Amazon is not only being affected by climate change but also how it is accelerating climate change. The environmental issues also negatively impact those living in the Amazon due to increased disease, famine, social unrest and economic downturn. This report outlines both the short and long-term impacts climate change has on the Amazon region as well as the social and economic impacts experienced by those living within the Amazon.

Session VIII: Identity/ies

Stauffer Library 121, Queen's Learning Commons, Stauffer Library

Thursday, March 5, 3:15-4:30

Moderator:

The Strength of Steel: Nationality and Power within Trinidad Carnival Music

Presenter: Aisling Palleschi, School of Music

Faculty Supporter: Dr. Margaret Walker

This paper discusses how steelband music within Trinidad carnival simultaneously enhances and confuses feelings of national identity. In my current research exploring politics and power in Caribbean carnival music, steel pan has proven to be a strong case study, providing compelling illustrations of the issues surrounding ethnicity, social and economic class structures, politics, and nationalism. The music of steel pan began as a lower-class, 'grass-roots', "vulgar, underclass pastime" (Dudley 2007: 3). To the elite citizens, steelband music threatened the social hierarchy and because the laws that society attempted to regulate banning the steel music dissolved, they believed the music would break down the class structures they tried hard to solidify. As it evolved, however, steelband music became gentrified, cleaned up by the elite classes of Trinidad. Through this evolution it can be interpreted that since the upper-class

citizens could not rid Trinidad of steel pan, they therefore attempted to 'improve' the image of steel so it could be accepted into society. Steelband has progressed since then to become a national and political instrument, used now to both affirm a political agenda and compete with it. By exploring an art form defined as a national instrument by Trinidad I show that a comprehensive study of how the development of the music can give insight into the problems and benefits of nationalism, identity, and tradition.

Works Cited

Dudley, Shannon. 2007. *Music from behind the Bridge: Steelband Aesthetics and Politics in Trinidad and Tobago*. USA: Oxford University Press.

The Identity Crisis of post-1997 Hong Kong: An Examination of the Composition and Fluidity of Hong Kong Identity

Presenter: Terence Ho, History/French

Faculty Supporter: Emily Hill

Hong Kong's history as a former British colony and current Special Administrative Region of China presents a unique case study in the formation of identity. To this day, many residents of Hong Kong do not view themselves as Chinese, that is, part of the People's Republic of China. Rather, surveys conducted by the Chinese University of Hong Kong reveal locals adopt the labels of "Hong Konger in China", "Chinese in Hong Kong" and "Hongkonger". In light of these findings, this study will examine the composition and fluidity of Hong Kong identity.

This study will first show how Hong Kong fails to meet the criteria for a unified identity with China as outlined by Anthony Smith in *National Identity*. The study then draws from Agnieszka Joniak-Lüthi's assertion in *The Han Minzu, Fragmented Identities and Ethnicity* that identities serve a dual purpose: as explanations of events and processes, and also as tokens of social positioning in instances of power distribution. The study proceeds to analyze four situations in which locals in Hong Kong chose to adopt either a Hong Kong identity or a Chinese identity, depending on the benefits and status procured from each identity: a mainland Chinese girl eating noodles on the subway, mainland Chinese mothers giving birth in Hong Kong, the Diaoyu islands dispute, and the 2008 Beijing Olympics. The study confirms that Hong Kong and Chinese identities co-exist among Hong Kong residents. Moreover, the study concludes that Hong Kong identity, despite its ambiguity, is undoubtedly calculated and reasoned.

"Nurturing Individuals, Kinship, and Culture: Kitchens as Social Spaces in Wayson Choy's *The Jade Peony* and Ruby Slipperjack's *Silent Words*"

Presenter: Danya Goldsmith-Milne, English

Faculty Supporter: Prof. Petra Fachinger

Developing a strong sense of community and preserving cultural identity are key components of Chinese Canadian and Indigenous literatures; this shared identity provides a sense of ethnic and cultural solidarity for so-called "visible minorities" in Canada, a key concern in both Wayson Choy's novel *The Jade Peony* and Ruby Slipperjack's novel *Silent Words*. In these novels the locus of culture becomes the kitchen or the campfire, sites where culture is made tangible through the preparation and consumption of traditional cuisine. In *The Jade Peony*, the Chen family kitchen is a social space where three generations of Chinese Canadians reinforce their kinship ties by sharing meals and other elements of Chinese culture. Kitchens and campfires function similarly in *Silent Words*: Danny connects with other Ojibwa people in these sites, strengthening his cultural identity and alleviating his isolation while simultaneously learning traditional methods of subsistence hunting and food preparation. By comparing passages from Choy's *The Jade Peony* and Slipperjack's *Silent Words*, it is shown that kitchens and campfires are both sites of

strengthened kinship connections and also function as vehicles for the preservation of culture through the preparation and consumption of traditional meals.

Session IX: Communities: Past, Present, and Future

Speaker's Corner, Seminar Room, Stauffer Library

Friday, March 6, 8:30 to 10:15

Moderator:

Yukon 2115: A Futuristic City Design with a Geological Twist

Presenters: Danielle Beaulne, Katie Irwin, Shelby Plant, and Brittany Thrasher

Faculty Supporters: Dr. Georgia Fotopoulos and Dr. Vicki Remenda, Geological Sciences

Current trends in anthropogenic greenhouse gas emissions and global warming show no indication of halting in the near future. Assuming that these trends continue up to the year 2115, it will become necessary to design a city which is adapted for the anticipated changes to the environment. In the Yukon Territory, terrain will change based on fluctuations in wind speeds, permafrost levels and precipitation, which in turn affects surface water routes. The technology available will also be more advanced, and it is possible that sustainable sources of energy will be more popular as well as economically feasible.

In order to integrate all of these geological, environmental and economic factors into one project, a city will be designed and modelled in the Yukon Territory for the year 2115. The design will be consider forward modeling of local climate change, precipitation, surface water routes and permafrost levels. The city will be designed to be sustainable, affordable, and have limited negative environmental and social impacts. Using this information, it will be modelled using the programs ArcGIS and SimCity and geological models may also be generated using geomechanical software such as Slide.

The city will implement a zero waste program and employ one or more of three sustainable energy sources: nuclear fusion, geothermal and solar power. The main industry of the city will be four lead-zinc deposits in the Selwyn Basin, on the eastern edge of the territory; it will provide jobs and a stable economy.

Queer/Race Geographies: Community and the Politics of Difference

Presenter: Emily Wong, Geography

Faculty Supporter: Prof. Audrey Kobayashi

Oppression is a concept which has been extensively examined in feminist and anti-racist geographies. Many people are engaging with anti-oppressive activism and politics, and are getting involved in challenging systems of domination. However, as resistance is also influenced and produced through systems of oppression, those who practice anti-oppressive politics are still under the influence of those systems. This research project explores the nature of how oppression may be replicated within communities which claim to be anti-oppressive.

For many queer people of colour, locations where community is found also become locations of exclusion. Using the framework of the politics of difference, the construction of community is examined in relationship to difference on the grounds of race and gender/sexual identity, in addition to how social positionality is negotiated and experienced. Constructions of community involve the act of drawing borders, defining proximities, and creating distance between people; it is a necessarily geographical concept. The experiences of people who are both queer and racialized are explored through the use of

qualitative interviews, providing insight into how patterns of oppression play out and how processes of human differentiation take place. Demarcating a "community" necessarily involves processes of inclusion and exclusion; that is, who constitutes the community, and who is placed outside of it. For many queer people of colour, locations where community is found also become locations of exclusion.

Performing Material Objects: Reconnecting the "now, then and since"

Presenter: Mariah Horner, Drama/History

Faculty Supporter: Jenn Stephenson

The Cellar Door Project is a theatre company in Kingston dedicated to producing historically authentic, site-specific original plays. Opting out of "pioneer village" style re-enactment and instead turning to slightly romanticized stories based on archival research, we believe that by animating sites that are present but affectively invisible in our daily lives, we inspire a rethinking of our connection to the past. Each show invites audience members to make a pilgrimage to historical local spots (City Hall, City Park, The Royal Tavern, etc.) to watch a semi-fictional re-telling of the stories of the site. Through performance, we hope to strengthen and modify our contemporary connection, create a bridge between that sties' original historical moment and the multitude of stories that exist between. By inviting people to remember the "now, then, and since" through the material world that has survived, we remind ourselves that we are a part of something bigger, reaching not only into the past but also to an imagined future.

This presentation will explore the creation process and audience response to two of our productions. Both *Stones in the Woods* (City Park) and *The Eliza Show* (The Royal Tavern) animated spaces that were still active in their real world functions at the time of performance, effectively asking our audience to peer into the past with the present still in view.

Questions to be considered include: Is a strictly educational approach the best way to encourage historical connectedness? Can we ask contemporary audiences to apply the same kind of environmental stewardship to the historical past?

Works Cited

Nora, Pierre. "Between Memory and History: Les lieux de mémoire." *Representations*. 26 (1989): 7-24. Print.

Historic Past, Promising Future: An Archival Research Project on Tourism and Identity in the Limestone City

Presenter: Jasmine Charette, History

Faculty Supporters: Dr. James Carson and Heather Home, Queen's University Archivist

1973: The City of Kingston holds a year-long birthday celebration in honour of its 300th called Tercentenary. Planning for this event takes three years and ongoing consultation with major stakeholders in the city and its residents. This archival research presentation discusses the original motives behind the Tercentenary Committee and its members, the key events in both planning and execution of Tercentenary, and major festivities throughout the year and their impact on the Kingston community and the image of Kingston as a historic city. As with many other heritage tourism events, the City uses Tercentenary to solidify community identity and civic pride in order to further promote tourism and profits from visitors. Benedict Anderson's *Imagined Communities* theory informs the project, alongside other Canadian examples of heritage tourism that shaped regional identity over the past century. Using these secondary sources, I will argue that the Committee(s) desire to tie the City's *Historic*

Past to its Promising Future shaped their perspectives on marketing Tercentenary to residents and Kingston stakeholders as much as to visitors. This project is one of the first in a new course offered in the History Department titled HIST 501: History/Queen's Archives Internship. Students complete archival tasks such as indexing and minor preservation and can choose to partake in a personal research project.

A Petrographic Analysis of Ancient Jordanian Ceramic Building Materials

Presenter: Dominique Dupuis, Classics and Geological Sciences

Faculty Supporter: Dr. M. Barbara Reeves

Although ceramic building materials (CBM) such as brick, pipe and roof-tiles were commonly used in the classical world, these types of artifacts have received only cursory study by modern scholars. Past studies have focused almost entirely on the inscriptions or decorations displayed on a small subset of CBM while ignoring the more crucial questions such as their composition and fabric. The goal of this research project was to decipher the similarities and differences in ancient Jordanian CBM using both a historical and scientific approach. This study was a continuation on the typology created by Humayma Excavation Project archaeologists (Reeves and Harvey) based on samples of CBM from Humayma and other Jordanian sites. The Humayma archaeologists have been developing typologies for each class of ceramic building material based on macroscopic differences in form and fabric. In order to test and refine the typologies created, a chemical and petrographic evaluation of these ceramic buildings materials was undergone. Geological laboratory evaluations were conducted in order to investigate whether these typologies were differentiable on a scientific level. The principal purpose of this project was to analyze ancient bricks and tiles in order to refine a diagnostic tool for dating the phases of occupation of the Nabataean to Early Islamic site of Humayma. Additionally, this research project examined CBM from other Jordanian in order to address questions of production and distribution.

Session X: Accelerating Change: From the Fox to the Frog

Speaker's Corner, Queen's Learning Commons, Stauffer Library

Friday, March 6, 8:30 – 10:00

Moderator:

"What Does the Fox Say" – A Review of the Grey Fox in Canada and its Current Status as a Threatened Species

Presenter: Marina Deere, Biology

Faculty Supporter: Dr. Raphaël Lavoie

In Canada, the grey fox (*Urocyon cinereoargenteus*) is found with certainty in Ontario and Manitoba, but has also been sighted in other provinces. Interestingly, there is little Canadian research on the grey fox, despite its status as "threatened" on both the Ontario Species at Risk list and on the Canadian Species at Risk Act. Possible reasons that the grey fox has not received as much attention as other at-risk species in Canada include its lack of economic value and its high abundance in the United States (US). It is believed that the grey fox was once as widespread as the red fox (*Vulpes Vulpes*) in Southern Ontario, but today that is no longer the case. It is currently believed that less than 250 individuals are found in Canada and the fate of their population is unknown. This change in population abundance shows the importance of gaining more information on the grey fox's current distribution in Canada. Within the US, the primary threat to this species is excessive hunting; while in Canada, by-catch, deforestation, and road mortality represent greater dangers. The focus of this presentation will be to summarize current knowledge on Canadian populations of the grey fox with some reference to populations in the US in order to highlight the importance of this trans-boundary species within Canadian ecosystems. I will provide

recommendations to both the Federal Government of Ontario and the Municipality of Peelee Island, while outlining possible conservation solutions for the population decline of the grey fox in Canada.

Using a Conservation Biology Blueprint to Protect Seven Species found in the Frontenac Arch Biosphere Reserve, Canada

Presenters: Alexandra Kelly and Monica Seidel, Environmental Science

This project developed a conservation biology blueprint for the Frontenac Arch Biosphere Reserve (FABR) region that can be used towards assessing current conservation practices as well as making future recommendations. The findings of the study can be used towards the Ten Year Biosphere Review for UNESCO, which the FABR submits to keep their biosphere designation. By gathering information in real time, appropriate actions can be taken much more quickly than if the information was only gathered every ten years. This means that different actors can alter their actions to preserve species diversity and success as different factors influence those species through time. For this study, seven species (bald eagle, red-headed woodpecker, common five-lined skink, black rat snake, milksnake, spotted turtle, and great blue heron) were mapped in the area between Frontenac Provincial Park and Charleston Lake Provincial Park. The black rat snake, spotted turtle, and great blue heron were specifically explored in an online survey as well. This study area was chosen on the suggestion of the FABR because it connects Crown Land with the provincial parks, making implementing any new policies easier than land found in the North-South corridor of Ontario which contains a high amount of private development. Using the predicted tree species data, county land usage, eBird data, and endangered species general distribution, this paper hopes to identify where key areas of protection are. By quickly locating hotspots for endangered species, stricter conservation regulations can be implemented to help the recovery of these species.

Impact of Surface Temperature and Salinity on the Ratio of Marine Diatoms to Dinoflagellates in the Trevor Channel Area

Presenter: Leah Combs, Environmental Science

Faculty Supporter: Dr. R. Lavoie

In an effort to illuminate the factors that influence surface phytoplankton community composition with respect to marine diatoms (Class Bacillariophyceae) and dinoflagellates (Phylum Dinoflagellata), temperature and salinity data were collected. Phytoplankton samples were collected at six surface water locations along the Trevor channel near Bamfield, British Columbia where sampling locations were of known gradients of salinity and temperature. Each sample was analysed under a light microscope, where 2 μ L volumes of seawater were counted for both dinoflagellate and diatom abundances. The ratio of diatoms to dinoflagellates was determined by averaging multiple counts of well-mixed samples from each station. Surface temperature and salinity data were collected using individual CTD (Conductivity, Temperature, Depth) casts, where only the surface values were considered. The phytoplankton ratios were then correlated to each of temperature and salinity. It was found with strong positive correlation that conditions with higher salinity favoured dinoflagellate-dominant communities ($r = 0.97$, $p = 0.00013$) and conditions with higher temperature favoured diatom-dominant communities ($r = 0.92$, $p = 0.0035$). This data may prove useful in studies regarding how small and large scale climatic changes affect phytoplankton community composition, and proves interesting directions in research as to how bottom-up controls on community structure can impact abundances of macro-organisms.

Not just a peep: The evolution of calling in *Pseudacris crucifer*

Presenter: Amanda Cicchino, Biology

Faculty Supporter: Dr. Stephen C. Lougheed

Reproductive isolation is the hallmark of speciation as defined by the biological species concept. A species that is evolving towards reproductive isolation, but has not reached full isolation, is defined as an incipient species. One mechanism used by incipient species to further drive speciation is the use of mate recognition signals. The spring peeper, *Pseudacris crucifer*, is a North American frog that can be classified as an incipient species, as previous studies have found 6 distinct mitochondrial lineages within its range. Spring peepers use vocal signals for mate recognition and exhibit a female choice mating system where the males call to attract females. This study investigates the evolution of calling in spring peepers. Using calls from each lineage across the full range of spring peepers, I analyzed 11 different characteristics to determine whether the calls were different, and if so, which characteristics are being selected for. Preliminary evidence suggests that the calls between the lineages are distinct and that certain characteristics of the call are more heavily selected for than others. Full analysis on the data has not been completed at this time. This study will expand the understanding of the evolution of spring peepers, as well as offer insight into the role of mating systems on reproductive isolation.

10:00 to 10:15 Break

Session XI: Livers and Kidneys and Brains, Oh My!

Speaker's Corner, Queen's Learning Commons, Stauffer Library

Friday, March 6, 10:15 – 11:45

Moderator:

Iohexol Plasma Clearance in Animal Models: The Clear Choice for Measuring Early Renal Dysfunction

Presenter: Mandy Turner, Biomedical and Molecular Sciences

Faculty Supporters: Dr. Michael A. Adams and Dr. Rachel Holden

Glomerular filtration rate is a measure of the kidney's ability to filter blood. In animal models of early kidney failure, there is no routine method to accurately measure GFR. The expensive gold standard of GFR measurement is exogenous inulin clearance. The commonly used method, endogenous plasma creatinine concentration, is unreliable and insensitive, especially at normal levels of renal function. This study investigates the utility of iohexol, an inexpensive radio-contrast agent as a promising exogenous marker for plasma clearance kidney function evaluation in rats. Early stages of progressive kidney failure were induced with a 0.25% adenine diet in male Sprague Dawley rats (N=8) over 5 weeks. Both plasma clearance of iohexol and inulin and creatinine concentration were evaluated following weekly venous injections and blood sampling. Plasma iohexol clearance and plasma inulin clearance strongly correlate ($R^2=0.95$). However, plasma creatinine concentration correlated weakly with iohexol ($R^2=0.53$) and inulin ($R^2=0.58$). Iohexol plasma clearance accurately measures changes in kidney function, especially in comparison to creatinine analysis. The data demonstrates creatinine is an inappropriate marker for renal function in early adenine-induced CKD rat models. Ongoing analysis of this data suggests refinement of the protocol will yield a simple method for routine measure of kidney function in murine lab animals. This tool will facilitate advancement in kidney disease onset and allow for more accurate interpretation of kidney function in the various animal models.

Extispicy in Classical and Near Eastern Society

Presenter: Nicholas Gill, Classics

Faculty Supporter: Dr. Fabio Colivicchi

Liver consultation was a practice in which the liver of an animal would be examined in order to receive messages from the gods. Ancient peoples would often perform this type of ritual before important decisions, such as committing to war, or signing a peace treaty. Throughout this paper, I examine three different systems of liver consultation from antiquity in chronological order—beginning with Babylonian extispicy since it is the most ancient, then moving to Greek hepatoscopy, and finishing with Etruscan haruspicy.

As the names of these systems of liver consultation are different (extispicy, hepatoscopy, and haruspicy), so too are the practices of each culture. In order to highlight these differences, I analyse five aspects of each civilization: 1) Their religion, and the place of liver consultation within it, 2) The priests or diviners who performed the consultation, 3) The visual sources and material remains relating to liver divination, 4) The ancient literary accounts about this practice, and 5) The system utilized by the diviners in order to read livers.

In an attempt to reconstruct the work of ancient diviners, I have undertaken a practical examination of sheep livers in the Babylonian, Greek, and Etruscan methods. I examined five sheep livers, each in all three methods, in order to determine the extent that divinatory procedure altered the message of the liver to the respective diviners. I conclude my paper by comparing the findings about each culture and relating my experience in the role of the diviner.

Targeting TAZ and YAP as a New Therapeutic Approach to Diabetic Nephropathy

Presenter: Lauren Chan, Biology

Introduction

Fibrosis is a major contributor to chronic kidney disease (CKD), for which no effective clinical treatment exists. The primary source of fibrosis is the activation of fibroblasts to the myofibroblast state. Fibroblast-myofibroblast transition requires transforming growth factor- β (TGF- β) and its canonical Smad signaling pathway.

Purpose

Recent findings suggest that mechanical stimuli affect fibroblast behavior. Nuclear localization of YAP/TAZ, closely associated mechanosensitive transcriptional co-factors, are regulated by substrate stiffness. As YAP/TAZ are Smad nuclear retention factors promoting TGF- β signaling, we hypothesized that YAP/TAZ inhibition could attenuate stiffness-mediated, TGF- β induced pro-fibrotic responses.

Methods

Immunostaining and immunoblotting were used to analyze localization and activity of YAP/TAZ and Smad levels, respectively.

Results

YAP/TAZ are in an active nuclear location in fibroblasts grown on stiff, fibrotic-like substrates (100kPa). In fibroblasts grown on soft substrates (2kPa), YAP/TAZ are primarily in an inactive cytosolic position. Cells grown on soft surfaces demonstrated strongly attenuated nuclear Smad 2/3 translocation and Smad-3 dependent transcription upon TGF- β stimulation, indicating impaired pro-fibrotic signaling. Verteporfin, a clinically approved drug with YAP inhibitory properties, was used to test the role of YAP/TAZ in reduced TGF- β signaling. Verteporfin reduced TGF- β -induced nuclear Smad2/3 accumulation and Smad3-mediated

transcription in fibroblasts grown on stiff surfaces. In vivo, Verteporfin significantly reduces markers of renal fibrosis.

Conclusions

Soft, healthy kidney-like substrates inhibit, while stiff fibrotic-like substrates promote, pro-fibrotic TGF- β Smad signalling. Verteporfin inactivates the YAP/TAZ fibroblast mechanosensor, reduces stiffness-augmented fibroblast responses to TGF- β through blockade of Smad signalling, and may be a novel anti-fibrotic agent for CKD.

Session XII: Pizza with Posters, 11:45-1:15

See poster abstracts beginning on page xxx

Session XIII: Politics of Difference

Seminar Room, Queen's Learning Commons, Stauffer Library

Friday, March 6, 1:15 – 3:00

Synthesis, Sense and Selfhood in D. H. Lawrence's 'Bavarian Gentians'

Presenter: Amelia McLeod, English

Faculty Supporter: Glenn Willmott

This paper synthesizes and extends a series of critical responses to D. H. Lawrence's "Bavarian Gentians" to produce a reading of the poem that emphasizes the ways in which the dissolution of Pluto's and Persephone's discrete senses of selfhood as a product of their sexual intercourse parallels and interacts with the narrator's own encounter with the simultaneous coexistence of life and death. It refutes the suggestion that Lawrence was disinterested in form, and argues that the structure of the poem mimics and supports the speaker's absorption into a sensory "underworld", where he is able to make contact with an essential and depersonalized expression of life or of generative essence. The paper incorporates arguments about the mutual confusion of Persephone's and Pluto's identities during their sexual encounters in this underworld to support a reading of the poem that suggests that the narrator experiences a similar disintegration of his sense of selfhood, and that his surrender to a sensory, rather than cognitive mode of experience is a prerequisite to his successful contact with a more enduring, universal version of living consciousness. The paper is concerned with identifying the strategies used by the poem to preserve the immediacy and centrality of the sense-experience it both describes and advocates, despite the necessary presence of language as a mediating factor.

The Other Side: Canada's Involvement with the British War Brides

Presenter: Kristy Wong, History

Faculty Supporter: Mark Croswell

The 45,000 British war brides who ventured overseas during World War II to live with their Canadian servicemen have been acclaimed for their bravery and romanticism for years. Canada, above all, seemed to provide the greatest extent of effort and accommodation to ship the war brides over. Each step of a British war bride's journey was superficially as comfortable as could be owing to the Canadian assistance initiative. Despite the majority of war brides who integrated into the community, certain war brides who could not acclimate were swept under the rug and success stories were accentuated. Thus, this study questions Canada's motives in the assistance initiative and the respective effects on the nature of the British war brides' journeys to Canada.

To investigate this assertion, primary sources were predominantly used, such as radio transcripts, provincial newspaper articles, oral histories, and government documents. Media sources, especially those government affiliated were weighed more heavily, demonstrating government intentions on what the mass public was supposed to perceive. The journeys themselves were categorized into three components: voyage preparations, the physical voyage, and integration into the Canadian community. After identifying public opinion, war bride representation, extent of Canadian assistance, and treatment of war bride failures, evidence suggests there was reasonable potential of war brides being used for political propaganda as a reflection of Canada's abilities on the world stage. This investigation introduces a critical perspective to Canada's involvement with the war brides.

Social and Academic Adaptation in International Students at Queen's University

Presenter: Nicole Persall, Psychology

Faculty Supporter: Arunima Khanna

International students from Queen's University were recruited to participate in a focus group regarding common challenges in social and academic adaptation. Responses from the focus group were recorded and transcribed. Thematic analysis was used to draw several major themes from the participant's responses. Based on the themes, recommendations to the university in regards to international programming are made. This study deepens the understanding of common issues faced by international studies and explores potential solutions to these issues.

Volunteer Bias in Studies of Female Sexuality

Presenter: Meghan McInnis, Psychology

Faculty Supporter: Dr. Meredith Chivers

Volunteer bias is the idea that people who choose to volunteer as participants in psychological studies may differ from those who do not. Studies of female sexuality may be particularly vulnerable to this bias, as such studies often ask personal questions, may involve viewing erotica, and may involve measures of genital arousal, requiring participants to undress partially and, in some cases, to attach a device to their genitals. The purpose of this study was to determine the characteristics associated with women's willingness to participate in sexuality studies and comfort levels with different types of sexual psychophysiology studies, which involve measures of genital arousal. Participants were women eighteen years of age or older, who completed an online study containing a demographics questionnaire as well as measures of sexual experience, sexual attitudes, sexual guilt, genital self-image, and social desirability, which were the five measures of interest for this study. The survey also included descriptions of different female sexuality studies and participants indicated whether they would be willing to participate in each study and their comfort level with participating. Data analyses are currently in progress. I hypothesize that the measures of interest will predict willingness to participate in different types of sexuality studies, and that reported comfort levels participating will differ across study types. My findings will provide new information regarding women's perceptions of different sexuality measures. Given the growing number of measures of women's sexual response, my results have the potential to enhance the external validity and generalizability of sexual arousal research.

Session XIV: Livers and Kidneys and Brains, Oh My! – Part 2

Speaker's Corner, Queen's Learning Commons, Stauffer Library

Friday, March 6, 1:15 – 3:00

A Within-subject Comparison of Peak Oxygen Consumption and Lactate Threshold following Endurance and Sprint Interval Training

Presenter: Jacob T. Bonafiglia, Mario P. Rotundo, and Jonathon P. Whittall
Faculty Supporter: Dr. Brendon Gurd, School of Kinesiology and Health Studies

Introduction: Both endurance training (END) and sprint interval training (SIT) increase VO₂peak and improve lactate threshold. Interestingly, considerable heterogeneity exists in the individual responses to training including the presence of non-responders following both END and SIT. Whether individual responses differ following END and SIT remains unknown. Therefore, the purpose of this present study is to compare VO₂peak and lactate threshold responses following both END and SIT within the same individuals.

Methods: 23 healthy men and women (age, 20.1 ± 1.1; VO₂peak, 42.1 ± 6.3 ml/min/kg) completed 2 3 week training periods (4 days per week) on a cycle ergometer separated by ~3 months. Training consisted of either 30 minutes at ~65% of VO₂peak (END) or 8, 20-second intervals at ~170% of VO₂peak separated by 10 seconds of rest (SIT). The order of training was counterbalanced such that 11 participants completed SIT first. All participants completed 3 VO₂ peak tests in the week preceding (pre) and in the week following (post) training for both training periods. Blood lactate samples were collected once per minute throughout the ramp test during the first VO₂ peak test pre- and post-training.

Results: For the first training cycle, training did not induce a statistically significant increase in VO₂peak (END, +1.2 ± 5.4 ml/min/kg; SIT, +0.4 ± 4.9) but lactate threshold was significantly improved following both protocols (END, +1.3 ± 2.0 min; SIT, +0.5 ± 1.9). The second cycle of training is currently underway with both group and individual comparisons between END and SIT planned for VO₂peak and lactate threshold.

Conclusions: It is anticipated that there will be variability in the response for both VO₂ peak and lactate threshold responses following END and SIT across all participants and that the amplitude of the training response to END and SIT within a given individual will vary.

The Relationship between Nutrition Knowledge and Dietary Restraint in University Female Athletes

Presenter: Emily Quick, Kinesiology
Faculty Supporter: Dr. Brendan Egan

Female athletes have comparable or only slightly higher levels of nutrition knowledge than non-athletic controls. This is of concern considering the high prevalence of eating disorders in female athletes. As nutrition knowledge is unable to alter dietary behaviour in isolation, the investigation of dietary restraint as a possible intermediate is warranted. The purpose of this study is to evaluate the levels of nutrition knowledge and dietary restraint, and investigate the relationship between the two, in a sample of female university athletes and non-athletic controls. Athletes (n=38), primarily participating in normal-build sports, and non-athletic controls (n=22) completed a questionnaire consisting of the General Nutrition Knowledge Questionnaire and dietary restraint subscale of the Three Factor Eating Questionnaire. Results indicated that levels of nutrition knowledge and dietary restraint do not differ significantly between groups. However, there was a non-significant trend towards increased levels of dietary restraint in athletes. No significant relationship was found between nutrition knowledge and dietary restraint in either group. Post hoc analysis showed a significant positive correlation between levels of activity and dietary restraint in non-athletic controls. Future research should investigate the relationship between nutrition knowledge and dietary restraint in female athletes participating in thin-build sports.

Probing procedural strategy with a spatial working memory task: A potential marker of intact frontal function

Presenter: Alenka Bullen

Faculty Supporter: Dr. Ron Levy

When engaging in spatial working memory tasks, in which subjects generate sequences of responses to spatial arrays of stimuli, patients with frontal lobe damage often fail to implement procedural strategies to facilitate memory performance. Conversely, impaired performance among patients with temporal lobe damage is unrelated to strategy use. Assessing spatial working memory in a non-human primate (NHP) affords the ability to parse the contribution of higher executive functioning (e.g., strategy formation) on short-term memory. The present study aimed to examine the spatial working memory performance of a healthy rhesus macaque across six weeks of task acquisition. The NHP was trained on the self-ordered spatial search (SOSS) task adapted from a human neuropsychological test battery (CANTAB, Cambridge Cognition, Ltd). This touch-screen task required the NHP to produce self-ordered sequences of responses to spatial arrays of 2, 3 or 4 targets. Delay periods (0.1 – 2s) between responses probed short-term memory. The NHP exhibited protracted learning to increases in task difficulty and reduced performance with additional targets and longer delay periods, demonstrating task sensitivity to short-term memory capacity. Analysis revealed that the NHP spontaneously developed a clockwise procedural strategy, employed independent of delay duration. These results suggest that the SOSS task is capable of modeling not only learning and memory but also higher cognition in an NHP, offering a means of investigating the cognitive systems that are differentially impaired in clinical populations.

Examining the Effectiveness of Passive Music Interventions on Alzheimer's Disease: A Pilot Study

Presenter: Sean Bai, Life Sciences

Faculty Supporter: Dr. Lola Cuddy

In the past two decades, many studies have been conducted showing the benefits of music interventions on the well-being of dementia patients and their caregivers. However, these studies have some features that are not very well defined. There is a need to better define what population of patients benefit most from music interventions, as well as what types of interventions have the greatest chances of improving behavioral and pathological symptoms of dementia. Different patients have different levels of musical enjoyment and cognitive skills, which may affect how effective musical interventions may be among different dementia patients. This study will examine if the level of musical engagement, musical training, and severity of dementia have an impact on the efficacy of music interventions for dementia patients. In other words, when given a music intervention, do those with better scores on music engagement, musical training, and severity of dementia have better scores for caregiver burden and depression? Also, will they score better than those with worse scores in the aforementioned factors? This study is currently being conducted in partnership with the Kingston Alzheimer's Society through data collected from their Music for Memories program.

Session XII: Poster Presentations

Queen's Learning Commons, Stauffer Library

Presenters will be present at posters Friday, March 6, 11:45-1:15

Posters will be on view March 5 & 6

1. Impact of Surface Stability and Hand Separation on Activation of Agonist and Stabilizing Muscles During Push-Up Exercise

Presenter: Mahadev Bhalla, Life Sciences and Biochemistry

Stability is an important factor to consider when designing an exercise program as recent studies have suggested that there can be benefits to performing exercises on unstable surfaces compared to rigid ones. Furthermore, to increase strength of the agonist muscles, pectoralis major and triceps brachii, various hand positions can also be implemented to increase stress on these muscles during an exercise.

Thus, our goal was to test the impact that surface stability and hand position can have on muscle activity of stabilizing and agonist muscles during a push-up exercise. Surface electrodes were attached to specific stabilizing and agonist muscles and electromyography (EMG) data was used to measure muscle activity. When compared to a rigid surface, a push up exercise performed on an unstable surface of a BOSU ball resulted in higher muscle activity for all the stabilizing muscles, while only the pectoralis major had an increase in activity for the agonist muscle group. In regards to hand position, a narrow hand spacing resulted in greater activation of all the stabilizing muscles and was able to specifically target the triceps brachii, while the use of wide hand spacing only isolated the pectoralis major. Hence an exercise program consisting of push-ups can target the stabilizing muscles further by using an unstable surface and a narrow hand position. In regards to the agonist muscles, the use of a specific surface and hand position can allow the user to target the agonist muscle they desire in a more efficient manner.

2. Recreating 19th-Century Stereography for a Scholarly Public

Presenter: Tiffany Chan, English

Note: Tiffany Chan's e-poster will be displayed on the mobile touch screen.

Current digital archives of stereocards, a popular form of early photography, offer only 2D scans of the cards' fronts. Such archives make large numbers of stereocards accessible, retrievable and searchable, but lack the informed, interpretive guidance that non-specialist users might expect. They also omit the information on stereocards' backs and privilege the photographs on the stereocards without attention to context or interpretation. Drawing on techniques of new media "edutainment," my virtual exhibit contextualizes and interprets stereocards from the Queen's University Special Collections Library in a way that is friendly to non-specialist audiences while organically promoting humanities research through features such as textual popups and hyperlinks to sources (where available online or in QCAT). Animated GIFs of the stereographs allow users to see the image in three dimensions—something that was available to a 19th-century audience but not necessarily to a 21st-century one. My project looks beyond the popular assumption that new media seeks, or should seek, to uncritically reproduce the experience of past media. Rather, I examine how new media allows us to be critical of past perspectives and biases in ways that were previously unavailable—while still remaining critical of my project's own limitations and potential biases. With the advent of digital media and the Digital Humanities, I argue that the time is ripe to rethink new media's relationship to old media and the past, as well as how to communicate this knowledge in ways that push beyond traditional notions of an academic digital archive.

3. The Possibilities and Implications of Policy Strategies to Integrate Aviation Biofuels into Transoceanic Commercial Canadian Jet Aircrafts

Presenter: Joshua Goodfield, Geography

Faculty Supporter: Dr. Warren Mabee

Aviation is a rapidly growing industry and transportation method in today's globalized world. Due to Canada's widespread metropolis areas across its large landmass, there is an increasing demand to offer international flights to support recreational travel and commerce. This project assesses the current emissions created through Air Canada's flights that deliver passengers to and from South America, Europe, Asia, and Australia. Through the data this project contains, Canadian policymakers can better understand the trends of the industry to best predict how more sustainable second-generation biofuels can be utilized to enact positive environmental change. The shift towards green aviation is progressing at very different rates throughout the world. However, as the environmental movement gains governmental legitimacy, contemporary innovators are beginning to challenge the ways in which carbon emissions can be effectively minimized. Canada has a clear lack of policy that makes biofuels, in the context of aviation, appear to be more of an idea instead of a practical solution. Various regions of the world have differing policies regarding how their governments and industry prioritize sustainable aviation. There are market-based policy approaches and mechanisms that Canada may choose to implement that would dictate the future of Canada's growing aviation sector.

4. The Role of Glycosylation in Cardiac Arrhythmias

Presenter: Maggie Hulbert

Faculty Supporter: Dr. Shetuan Zhang

Long QT syndrome (LQTS) is a debilitating cardiac arrhythmia, and mutations or malfunctions in the *human ether-a-go-go-related gene* (hERG) are the most common cause of LQTS. hERG is responsible for the cardiac potassium current (I_{Kr}), which is important for cardiac repolarization. It has 6 transmembrane domains, ranging from S1 to S6, and a complex N-linked oligosaccharide chain resides on the extracellular S5 pore linker region. The role of this glycosylation chain in hERG function has not yet been well distinguished and in the current study we aim to investigate the relationship between hERG protease susceptibility and the presence of the glycosylation chain. Using molecular techniques, we demonstrate that de-glycosylated hERG channels are degraded by the serine protease Proteinase K at a much faster rate than their glycosylated counter parts. Additionally, through removal of the end-chain sialic acid residues using the enzyme neuraminidase, we conclude that it is likely the physical blockade of susceptible protease sites that grants wild type hERG this glycosylation-dependent protection as opposed to charge repulsion facilitated by specific sugars in the carbohydrate chain. Our data show that the glycosylation chain found on hERG plays a role in protecting the channel from protease degradation, and could provide valuable insight into the development of the cardiac arrhythmia Long QT Syndrome.

5. Uncontrolled Cell Division and Migration of Q neuroblasts in mutant strains of *C. elegans*

Presenter: Brandon Lam, Biology

Faculty Supporter: Ian Chin-Sang

Cancer is one of the most prevalent and deadly diseases in today's society, affecting millions of people around the globe. Uncontrolled cell division and migration which are two of the six major hallmarks of cancer have been studied extensively in vitro, however in vivo these hallmarks are not well understood. We used the *Caenorhabditis elegans* nematode worm as our model organism in order to study these two

hallmarks. In unfavorable environmental conditions such as starvation, *C. elegans* can enter a developmental arrest in where certain cell metabolism ceases to continue, this stage is known as L1 arrest. Normally in L1 arrested worms, there are 2 distinct Q neuroblast cells which are precursors of sensory and interneurons that do not divide and migrate. However, when we mutate certain genes, we noticed that the two Q neuroblasts inappropriately divided and migrated, this suggests that we have identified a good model to study uncontrolled cell division and migration. We have already found one gene that when mutated, results in the Q neuroblasts inappropriately dividing and migrating at L1 arrest, now we are looking for other mutated genes that can cause this phenotype, this ultimately allows us to identify new mechanisms that cause an increase risk in cancer.

6. Perennial grasses as a viable biofuel source in eastern Ontario

Presenter: Jason LeBlanc, Geography

Faculty Supporter: Dr. Neal Scott

Climate change and energy security issues have made renewable energy production an important global issue. Bioenergy crops may be able to provide a large amount of the world's energy needs; therefore it is important to determine their potential for viable and sustainable use. Perennial grasses are an ideal bioenergy crop because they grow quickly across a wide range of climatic and soil conditions. Nitrogen based fertilizers are often used to increase productivity but overuse can lead to excessive nitrous oxide (N₂O) emissions, a greenhouse gas (GHG) 300 times more potent than carbon dioxide (CO₂). Fertilizing becomes counterproductive when N₂O emissions outweigh the benefit gained from reduction in CO₂ emissions.

Three perennial grass species (*Panicum virgatum*, *Schizachyrium scoparium* and *Andropogon gerardii*) were grown in collaboration with Lafarge Cement in Bath, Ontario. Each species was grown under three different fertilization regimes: 0, 50 and 150 lbs/acre of nitrogen as urea. Results of one study indicate that low levels of fertilizer addition enhance the GHG benefits of the grass, but results from another site suggest no benefit.

Our current research is exploring the importance of various soil processes to production of GHG's in these perennial grass bioenergy systems, and whether the grasses alter soil conditions to favor certain soil processes. The information gained will help to further predict the feasibility of using nitrogen fertilizers to enhance production in these bioenergy systems and the overall viability of bioenergy crops for cement manufacturing and other applications.

7. Examining the Impacts of Zebra Mussels as an Invasive Species in the Great Lakes Region and the Role of Stakeholders in Effective Mitigation Strategies

Presenter: Shuang Liang, Environmental Science

Faculty Supporter: Dr. Raphael Lavoie

Zebra mussels were first introduced into the Great Lakes region in 1988, via the ballast water of international ships traveling through the St. Lawrence River. Since then, the aggressive colonization of zebra mussels have had devastating effects on the native aquatic biodiversity in the Great Lakes region. The continued proliferation of zebra mussels have led to increased filtering, high light transmittance through water and growth of benthic (lowest level of a body of water) plants. Due to the intensive

filtration of zebra mussels, rapid bioaccumulation of botulinum toxin in their systems have caused high levels of mortality for waterfowl predators. As zebra mussels continue to dominate in predator-prey interactions and interspecies competition, a shift in the ecosystem equilibrium is occurring on varying trophic levels. These changes have not gone unnoticed. Zebra mussels have cost Canadian industries, businesses and communities over \$5 billion in a single decade in clogged pipes and turbine damages. The associated economic repercussions from infrastructural damages and native species declines necessitate engagement from a multitude of stakeholders. Public awareness is absolutely vital in minimizing the impact of zebra mussels and preventing their distribution across freshwater in North America. In this presentation, I will discuss the ecological, economic and societal impacts of zebra mussels since their introduction to the Great Lakes region. In addition, I will examine a multitude of management strategies and recommendations to government, private sector and public stakeholders to reduce future impacts of mussels in the Great Lakes region.

8. Evaluation of Snow Fungus Polysaccharides on benzo[a]pyrene-induced DNA Damage

Presenter: Daisy Liu

Faculty Supporter: Dr. William Diehl-Jones, Nursing Department (University of Manitoba)

Snow fungus, *Tremella fuciformis*, has been demonstrated to have numerous health benefits including purported chemopreventive properties due to free radical-scavenging ability. Protective effects derived from snow fungus polysaccharides are evaluated on Chinese hamster lung fibroblasts (CCL-39) exposed to carcinogen benzo[a]pyrene known to cause free radical formation and oxidative stress to cells. In this experiment, it was hypothesized that the naturally occurring polysaccharides in snow fungus are able to protect against or reduce oxidative stress-induced DNA damage. Polysaccharides were isolated through an alkaline extraction and *in-vitro* digestion. DNA damage was measured using the single-cell gel electrophoresis comet assay after exposure to benzo[a]pyrene and polysaccharide extract to lung fibroblasts. Results were calculated using the mean and standard deviation data of tail length and area, respectively. Each damaged cell was measured and analyzed through ImageJ Editing Software. The results indicate a promising trend which depict snow fungus polysaccharides yielding lower levels of DNA damage compared to cells exposed to benzo[a]pyrene and compared to the negative control (phosphate buffered saline and Dulbecco's cell medium). This study suggests polysaccharides from *Tremella fuciformis* could truly prevent cellular DNA damage by protecting against oxidative stress.

9. A Stylistic and Chronological Assessment of the Footprint Petroglyphs from Humayma

Presenter: Darcy Lovsin, Classics

Faculty Supporter: Dr. M. Barbara Reeves

The archaeological site of ancient Hawara (modern day Humayma), located in Southern Jordan, consists of occupational phases extending from the Neolithic period until present day. The site represents many diverse cultural groups, including Nabataean, Roman, and Byzantine. During a 2014 field survey, more than 150 petroglyphs were discovered in the mountainous area to the west of the ancient site. These petroglyphs included rock carvings of bovids, humans, and of particular interest to this research project, footprints. Since early humanity, man has been carving footprints all over the world, with various meanings and reasons for doing so. The goal of this research project was to analyze the footprint petroglyphs found surrounding Hawara, in order to determine what each carving was meant to represent, and what general time period each carving came from. This was accomplished by focusing on the artistic style and representation of each footprint, as well as the stratigraphic layering of the carvings.

By organizing photographs taken of each footprint into a database, and cross-analyzing them against each other, as well as against other known petroglyphs from Southern Jordan, the study showed that humans have been carving footprints into the hills surrounding Hawara since ancient times, presumably as a way to mark their presence in the area. Over the course of the site's history, humanity's motivation for wishing to leave their mark on the land differs, from religious or spiritual reasons to personal. It is hypothesized that over the centuries people carved the footprints around Humayma as offerings to their local gods, most likely to ensure a healthy rainfall and successful harvest in the desert climate.

10. Mature Fine Tailings Management in Oil Sands Mining

Presenter: Christina Lynch, Geological Engineering

Faculty Supporter: Dr. Vicki Remenda

Oil sands mining operations produce mature fine tailings (MFT), composed mainly of clay particles suspended in water, that requires decades to consolidate, currently taking up a great deal of storage space in tailings containment facilities. This in turn decreases recycling of process affected water and creates the need to use more land for tailings storage. As mandated by the Alberta Energy Regulator's Directive 074, oil sands producers must provide tailing management plans to remove and consolidate 50% of the MFT produced into trafficable deposits annually as of 2013. Oil sands producers have failed to meet the Directive 074 goal, as current technology does not provide economical and time efficient methods of consolidating MFT. Current technologies including consolidated tailings, centrifugation, freeze/thaw and thickened tailings were reviewed and compared to recently proposed technologies not currently used in the oil sands. The most effective technology or combination thereof for the treatment and consolidation of MFT is determined with the main focus being cost effectiveness and time efficiency.

11. The Treatment of Aboriginal People in Canada during the 20th Century: Assimilation, Genocide and the Question of Intent

Presenter: Tara Rose McDonald, Political Studies

The United Nations definition for the term genocide requires that the accused party acts with "intent to destroy" another group. The question of intent provides the foundation for examining how assimilation and genocide are two possible difference elimination strategies that were employed by the Canadian government during the 20th Century against Native Canadians. Comparing the colonial setting that defines the Canadian case with the civil war setting that preoccupied the 1992 Bosnia genocide effectively highlights similarities between the two case studies. The similarities provide the opportunity to explore whether the condition of intent can be proven in such intricate environments, and whether or not the international community should give such heavy consideration to intent during the classification process for genocide.

12. Fantasy and the Holocaust: Suspending Belief to Grasp the Unbelievable

Presenter: Sheryl Nauth, History

This paper endeavors to explore how recent media has engaged with the memory of the Holocaust, and, more broadly, how fiction and technologies have found new and effective ways to engage with controversial histories. I propose specifically, fiction, fantasy, and magical realism are innovative ways of

keeping memory of atrocities in history, such as the Holocaust, alive. I examine the genre of fiction and magical realism, while bringing particular examples from Yoram Gross' animated series *Sarah and the Squirrel*, Jonathan Safran Foer's film *Everything is Illuminated*, and Luc Bernard's upcoming video game *Imagination is the Only Escape*. These three are all vastly different medias, but share very common motivations: to engage with history, principally the Holocaust, through imaginative and interactive story telling. Each also treat the subject of representation and memory, concluding that "reality" is diverse, fragmented, and ever changing through time and people. Through the fantastical, their stories lead spectators with a child-like perspective through experiences that transfer meaning, feelings, and affect, rather than facts. As survivors continue to pass away and time and distance puts the unbelievable events of the Holocaust in the far inaccessible past, the new generation endeavors to find immersive, interactive medium to continue to keep memory –what Alison Landsberg refers to as "prosthetic" or artificial memory –alive. While unconventional, the works listed above demonstrate that fantasy and magical realism can be an engaging, informative, and worthwhile form to engage with history, especially histories of violence.

13. Dual Energy Computed Tomography for Perfusion Imaging

Presenter: Carly Pellow, Engineering Physics

The metastatic spreading ability of cancer heavily depends on microcirculation, requiring the formation of new blood vessels in the vascular network, or angiogenesis. Indirect measurement of angiogenesis can be performed by computed tomography (CT) perfusion imaging, where blood flow is observed using dynamic contrast-enhanced techniques. However, contrast-enhancement in tissues can be poor due to inadequate CT calibration, leading to an increase in radiation dose to the patient. It is hypothesized that the use of dual-energy CT will provide a more robust basis for calibration of contrast-enhanced imaging without increasing dose. The purpose of this study is to improve the sensitivity and accuracy of perfusion imaging by using atomic number extraction of iodine contrast agent concentration from dual-energy datasets. A stoichiometric calibration for CT was done with the effective atomic number and relative electron density extracted in MATLAB, resulting in a wider dynamic range of effective atomic number per mgI/mL. Dual-energy CT as a tool for calibrating perfusion imaging shows promise of increasing the range and signal to noise ratio of contrast-enhanced CT imaging. Future work will extend the study from a static to dynamic quantification to explore dual-energy CT for perfusion imaging, with the goals of developing a robust stoichiometric calibration for quality assurance purposes, and further insights on tumour angiogenesis and cancer metastasis.

14. Implementing a Quantum Solution to Database Hierarchy Control

Presenter: Helen Percival, Engineering Physics

Faculty Supporter: Dr. Selim Akl

Data access control in a hierarchy is currently a complex structure. Different groups need access to sets of data, some of which overlap, while the rest of the data remains secret. Managers and directors need to access the data that is hidden from regular users. To manage this, users are organized into partially ordered sets, or posets. Nodes in the posets represent users with the same access rights.

Current solutions use independent keys to access sections of data. This is chaotic, particularly for upper users in the hierarchy. A proposed solution is up-down computable keys, as described by Nagy and Akl in 2010 [1]. The downfall of this solution is that it is only applicable to stable posets. Users leaving and

entering the organization at arbitrary levels or even moving within the structure, may invalidate multiple keys or even all the keys in a poset.

Nagy and Akl [1] propose a quantum mechanical solution; by managing systems with two keys per user, a quantum and a classical key, the database is able to use computable keys that the user has no access to. Instead of direct access to the key, the system uses the quantum and the classical keys to compute the access key.

The purpose of the study is to design a physical system to implement quantum key database access, able to accommodate large businesses and governments with large, fluctuating and complex organizational hierarchies. Such a system would also be highly secure, suitable for databases with sensitive data.

References

[1] N. Nagy and S. G. Akl, "A quantum cryptographic solution to the problem of access control in a hierarchy," *Parallel Processing Letters*, vol. 20, no. 3, pp. 251–261, 2010.

15. Barriers to the use of Femoral Nerve Blocks to Manage Hip Fracture Pain among Frail Elders

Presenter: Madison Riddell, Life Sciences

Background: Hip fractures are a common source of pain and related morbidity among the frail elderly. One technique that has been shown to adequately manage pain in this population is the femoral nerve block. However, it is not currently employed routinely in Alberta emergency departments.

Objective: The first objective was to systematically review the recent literature around the use of femoral nerve blocks. The second objective was to survey physicians about the potential barriers to routinely performing femoral nerve blocks in the emergency department.

Materials and Methods: Searches of Medline, EMBASE and the Cochrane Trials database were conducted between 2010 and 2014 to identify randomized control trials examining the use of femoral nerve blocks in the ED to manage acute hip fracture pain among older adults (65 years of age and greater). The results of the systematic review were used to inform the development of the barrier survey. The survey was distributed to physician members of the Alberta Emergency and Bone & Joint Strategic Clinical Networks.

Results: Seven randomized control trials were included in the review. Four studies employed a single femoral block, while three employed continuous (catheter placed) femoral blocks. All of the studies reported statistically significant reductions in pain. All but one study reported that patients treated with femoral nerve blocks consumed significantly less rescue analgesia. Finally, there were no significant adverse effects reported with the femoral block procedure.

Surveys are still being collected and evaluated.

Conclusions: Femoral nerve blocks appear to have benefits both in terms of decreasing pain and limiting the amount of systemic opioids administered to frail older adults experiencing a hip fracture. The results of this review and the barriers survey will help inform the development of knowledge translation strategies to increase the routine use of femoral nerve blocks.

16. Obesity Surveillance: An Investigation of Health Policy and Programs in Ontario

Presenter: Allyson Schilkie, Sociology

Faculty Supporter: Dr. Scott Thompson

Today, childhood obesity is one of the most important challenges our society faces. The objective of this research project is to contribute to ongoing academic discussions of how to address issues of childhood obesity. To accomplish this goal, this project investigates the historical development of policies and educational programs regarding childhood obesity issued by the government of Ontario and Halton District School Board. In particular, this project explores the following questions: 1) Is there evidence of childhood obesity in Ontario and/or the Halton region? 2) What educational programs, policies, or action plans has the Ontario government and Halton District School Board established to target childhood obesity? 3) Are existing policies, educational programs, and action plans of health promotion considering children as a vulnerable population thereby maintaining a safe environment for children? Specifically, this project speaks to policy makers and educators by examining the risks and social impacts of policies and programs. For example past surveillance techniques created to collect statistics of childhood obesity, develop policies, and evaluate educational programs have been criticized for scrutinizing persons through a process of monitoring, analyzing, and comparing (Rich 2010) as well as breaching persons' rights to privacy (Haggerty and Ericson 2000). Overall this project will contribute to ongoing academic discussions regarding how best to address childhood obesity because evidence drawn from past policies, educational programs and action plans can be used to develop more effective means of impacting childhood obesity while also being mindful of the potential risks of surveillance based educational programs.

17. Within-Object Attention: Attentional Concentration and Amplification in Moving Versus Static Conditions

Presenter: Shira Segal

Faculty Supporter: Dr. Daryl Wilson

When presented with multiple stimuli, attention serves to help us select which items to focus on for further processing. The techniques we apply to determine where to focus within an object are less clearly understood than those applied for selecting objects. This study aims to observe if there are any existing trends in how we allocate our attention within objects, as well as to examine how different factors affect this cognitive process. Two previously identified trends in how attention is allocated within lines are attentional concentration – a tendency to focus on the center of the lines – and attentional amplification – the increase in center focus as line length increases (Alvarez and Scholl, 2005). Object dynamics is a variable that can be manipulated to test if these effects represent a higher-order tracking strategy, or whether they will still be exhibited when presented with stationary lines. This study examines whether these effects can be replicated when tested with moving lines as well as stationary lines. 22 participants completed tracking tasks, either moving or static, where they tracked two designated target lines while simultaneously watching for the appearance of a probe at either the center or end of any of the lines. In the moving condition, probe detection was significantly lower at the ends of lines (indicating attentional concentration), and this decrease in performance grew slightly as line length increased (indicating weak attentional amplification); however, no significant differences in probe detection between centers and ends of lines were found in the static condition.

18. Comparing Relationships between Plant Body Sizes and Minimum Reproductive Threshold Sizes for Species of Contrasting Life History

Presenter: John Serafini, Biology

Faculty Supporter: Lonnie Aarsen

Two traits are fundamental in defining plant life history strategies: How big can a species get? And how big does it need to get before it can reproduce? Previous research has shown that there is a general positive relationship between these two traits, across species, and this can be accounted for as a trade-off. In this project, I explored whether this relationship differs among herbaceous species with perennial versus annual or biennial life histories. Perennials, because of their capacity to grow across several years, might generally be expected to display a relatively large MAX (maximum potential body size) and hence large MIN (minimum reproductive threshold size) compared with annuals or biennials that live only one or two years. In addition, annuals/biennials might be expected generally to have a smaller MIN for a given MAX, compared with perennials because of selection in the ancestral past — i.e. in frequently disturbed habitats, where annuals and biennials are common, predictable early death (from disturbance) has imposed strong selection to produce at least some offspring quickly, regardless of how small/suppressed the plant might be. I tested these predictions for resident plants sampled from natural populations of 105 species found in the vicinity of Kingston, Ontario. Remarkably, the results support neither prediction, and point to an alternative consequence of selection in shaping plant life history strategies; i.e. small MIN for a given MAX has also been favoured in perennials but for a different reason — as a strategy for competitive fitness.

19. Determining the Ice-binding Face of an Antifreeze Protein from the Grass, *Brachypodium distachyon*

Presenter: Lindsay Smith, Biology

Faculty Supporter: Dr. Virginia K. Walker

At subzero temperatures extracellular ice growth can kill plants by dehydrating cells and rupturing their membranes. Some grasses can protect themselves from this damage by producing antifreeze proteins (AFPs). These AFPs irreversibly adsorb to growing ice crystals and prevent further growth. This is measured by ice-recrystallization inhibition (IRI), whereby ice crystals remain small at high sub-zero temperatures. An AFP from *Brachypodium distachyon*, a temperate grass, has been structurally modelled as a left-handed beta helix with two flat 'faces' on either side of the molecule. I am trying to determine which 'face' is important for ice adsorption. I have made mutations in the sequence encoding the AFP so that a small, flat amino acid is replaced by a bulky residue, which will likely interfere with the "fit" of the protein to ice. A mutation on one of the flat 'faces' of the protein seems to retain all AFP activity, whereas mutations on the opposite 'face' appear to cause a loss in activity. Therefore, I believe that this latter 'face' is the one important for ice-binding. By understanding how proteins interact with ice, it may be possible to develop new technologies such as environmentally-friendly de-icing agents.

20. Discovery of Novel Proteins Involved the Insulin/IGF-1 Signalling Pathway

Presenter: David (Wen Xiao) Wei, Life Sciences

Faculty Supporter: Dr. Ian Chin-Sang

The insulin/insulin growth factor-1 (IGF-1) signalling (IIS) pathway plays a key role in metabolism, growth and development. Though research has elucidated aspects of this pathway, it is not fully characterized or understood. A better understanding of the pathway will give insight into related diseases such as cancer. To discover novel proteins involved in the IIS pathway, the *C. elegans* worm was used due to the homology its insulin/IGF-1 receptor shares with that of humans.

To identify novel protein interactions with the insulin/IGF-1 receptor, we performed a yeast two-hybrid screen using a library of worm proteins. We found several separate interactions with the worm homolog of the HSP90 protein.

To support the involvement of HSP90 in the IIS pathway, we studied the phenotypes of worm strains with a mutant form of HSP90. They showed a similar phenotype to those that have a mutant form of the insulin/IGF-1 receptor, inappropriately entering a developmental stage known as dauer. This strongly suggests the involvement of HSP90 in the IIS pathway.

Based on previous research, we hypothesized the interaction between HSP90 and the insulin/IGF-1 receptor may allow it to bind other proteins. Thus, we performed a modified yeast two-hybrid screen to identify proteins which interact with the receptor in the presence of HSP90. The screen identified 15 interactions, many more than with the insulin/IGF-1 receptor alone, supporting this hypothesis.

Overall, we provide evidence of a novel interaction with insulin/IGF-1 receptor, suggesting HSP90 may be a potential target for developing therapies for IIS pathway related diseases.

21. A Stylistic, Spatial and Cultural Assessment of the Bovid Petroglyphs from Humayma

Presenter: Emily Welsh, Life Sciences/Classics

Faculty Supporters: Dr. M. Barbara Reeves

During the summer of 2014, more than 150 petroglyphs were discovered in the sandstone ridges west of the ancient town Hawara (modern day al-Humayma). The site, located in southern Jordan's Hisma desert, boasts a diverse occupational history spanning from the Neolithic period to the present and representing many diverse cultural groups. The petroglyphs discovered west of the site depict various imagery, including animals, humans, and footprints. Among the animals, various representations of bovids were discovered, including ibex, gazelle and oryx. This study analyzed the bovid petroglyphs, focusing on their spatial relationships with one another and the environment, as well as the various stylistic depictions observed and potential genus identifications. A cultural assessment was also completed to examine the animals' role through time, and other petroglyph representations discovered in the region were examined to pursue potential meanings for the newly discovered bovid petroglyphs. The petroglyphs depicted different artistic styles and could be sorted into categories based on artistic design and themes. The themes included solitary animals, interacting animals, predator/prey relationships and human hunting. The occurrence of the categories was analyzed across three study areas and in relation to the environment allowing potential explanations for their meanings to be proposed, each linked to the cultural groups that theoretically produced these petroglyphs.

22. Immune Response to *Stenotrophomonas maltophilia* in Cystic Fibrosis Patients

Presenter: Jillian Wettlaufer, Biology

Background: *Stenotrophomonas maltophilia* is one of the most common multidrug-resistant organisms isolated from the cystic fibrosis (CF) respiratory tract but it is unknown how it influences the long term clinical outcomes of CF patients.

Objective/Hypothesis: To characterize the immune response to *S. maltophilia* and its association with clinical outcomes in CF patients over time.

Methods: This was a longitudinal study from 2007-2014 of CF patients followed at The Hospital for Sick Children and St. Michael's Hospital. All patients were classified as: 1) those with chronic *S. maltophilia*: ≥2 positive cultures/year, 2) intermittent *S. maltophilia*: 1 positive sputum culture/year, and 3) no *S. maltophilia* cultures/year with and without chronic *P. aeruginosa*. IgG/IgA/IgM serologic responses were measured in serial sera samples by ELISA using whole cell *S. maltophilia* antigen. Results were calculated as the ratio of the average serum sample optical density to the average optical density of the negative control wells. Antibody levels for each patient were compared longitudinally to their rate of decline in FEV₁ % predicted, body mass index, and rate of hospitalization.

Results: *S. maltophilia* antibody levels were measured in 350 sera samples from 113 CF patients. Median baseline antibody levels were 1.56 (range 0.996-5.15) in chronic patients, 1.09 (range 0.907-3.79) in intermittent patients, and 1.12 (range 0.737-4.86) in patients with no *S. maltophilia*.

Conclusions:

Preliminary data suggests antibody levels to be significantly higher in patients with chronic *S. maltophilia*, and no significant difference between intermittent *S. maltophilia* and no *S. maltophilia*.

22. Heroism and Heartache: Representations of Horatio Nelson in 19th Century Popular British Music

Presenter: Sam Zimmerman, English Language and Literature

Faculty Supporter: Shelley King

This research project seeks to establish a print culture context for popular British music during the time of the Napoleonic Wars. More specifically, this project investigates representations of Horatio Nelson, the Battle of the Nile (1798), and the Battle of Trafalgar (1805) to understand representations of heroism and the nature of public and private spheres during the time of the Napoleonic Wars. By studying these representations in popular song, this research better understands the jingoistic tropes of British early 19th century Britain as well as attitudes towards heroism and the Napoleonic Wars. Songs used in this project are: "Nelson's Tomb," "The Battle of the Nile," "The Death of Nelson," "The Disbanded Soldier" "The Mouth of the Nile," and "The Orphan Boy's Tale." The conflicting perspectives found in these songs provide a greater understanding of British culture during the Napoleonic Wars. Songs which exclusively represent Nelson as the quintessential heroic sailor in the public sphere and Britain's military acts as divinely sanctioned, choose to ignore Nelson's relationship in the private sphere, and contrast songs which reject unqualified celebration in the wake of war, and focus on mourning as a result of the war. This disparity reflects the complexity and internal tension of 19th century British society, specifically oppositional attitudes of jingoism and mourning, as well as the celebration of renowned heroes versus the disregard of unknown soldiers and the dead. By considering such historical perspectives on war, we might better understand the voices that speak of war in our own time.

ALPHABETICAL LIST OF PRESENTERS

Presenter

Session #

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