

## 2015 TRU Undergraduate Conference Abstracts

### CONCURRENT SESSION PRESENTATION ABSTRACTS

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#### **The Impact of Recession on Students' Labour Market Outcomes: Evidence from Canada**

Ahmed, Sabbir

This research project analyzes the impact of recession on students' labour market outcomes. Tuition fees continue to rise across Canada. Between 1990 and 2011, Canadian students experienced an increase in tuition and ancillary fees at an average rate of 6.2%. In 2014, students in Canada paid on average \$7,026 as part of tuition and ancillary fees. Further, an estimated amount of more than \$5000 was associated with attending university away from home. Canadian students find it increasingly difficult to cover the costs of education. Obviously, one source of education financing is student loans. However, loan financing increases debt load and it is estimated that 60% of Canadian students graduate with an average debt load of \$27,000. Given the problems associated with debt, many students find it necessary to work during the summer and also during the regular academic sessions. Certainly, earnings from employment help many students to continue education. A post-secondary education is not only important for students' earning and job potentials, but it also develops Canada's human capital, which ultimately leads to economic growth. A potential threat to students' employment opportunities is economic recession. A recession has negative impacts on the productive activities in the whole economy and thus it is obvious that students are also affected. However, an interesting issue is the severity of the impact of recession on students' labour market outcomes such as labour force participation, employment rate and unemployment rate. If recession significantly impacts students' labour market outcomes, then policy makers may need to take extra steps to help students so that they can continue their education.

#### **Agent-Based Modelling and Simulation for Crowd Behaviour and Control Studies**

Alzate, Hector

Crowd control and behaviour studies are gaining importance as police departments around the world start working on ways to better train officers. For such tasks, we offer Agent-Based Modelling and Simulation as a tool to test and evaluate the possible outcomes of the interactions of different kinds of artificial agents conforming crowds in urban areas. This is accomplished with a realistic human-like crowd behaviour based on Sociological studies. We use the Vancouver Riot event as a test scenario with a virtual model of the area near to the stadium.

**Tranquile: A Serious Game to Learn about Environmental-Sustainability**

Alzate, Hector

Environmental sustainability has become a central topic in educational research. This is the outcome of a developing global awareness of environmental problems. Consumerism and the depletion of natural resources are imposing unprecedented strains on the environment. One of the main concerns is how to introduce young people to key issues in the area of environmental sustainability. We are exploring ways to develop and use serious video-games for this purpose. The students who play these games will be involved in an active and exploratory kind of learning, rather than the more passive approaches to learning associated with traditional classroom instruction. To further enhance the learning experience of students, local landscapes will be used as digital settings for the games we are designing. The goal of the presentation is to demonstrate some of the key steps in game design and to discuss how game design is connected to new research on learning.

**Two Surveys: An Analysis of Canadian Undergraduate Research Conferences**

Andrews, Debra

Since the late 1990's, undergraduate research and subsequent dissemination of research findings at undergraduate conferences have become important components of undergraduate education in universities world-wide. A search for existing research on this activity in Canadian universities reveals a scarcity of such and prompts the need to investigate the relevance of this significant aspect of higher education in Canada. This paper examines the prevalence and various modalities of undergraduate conferences in Canada and offers a close look at student awareness and participation in two of these events held annually at Thompson Rivers University located in Kamloops, British Columbia. Influenced by existing international academic literature, this paper looks at the development of two mixed-methods surveys intent on acquiring data to advance the conversation about undergraduate research conferences that may prompt further study of undergraduate conferences at Canadian universities. This research may also provide incentive to develop innovative research opportunities for Canadian undergraduate students.

**Rate of Crystal Formation and its Impact on Purity: An Investigation Using Scanning Electron Microscopy and X-Ray Spectroscopy**

Ansari Pirsaraei, Parta

Iadarola, Andrew

Paetkau, Owen

Crystals are solids that form by a regular repeated pattern of molecules. Second-year chemistry textbooks profess that crystals formed more slowly have fewer impurities than rapidly-generated crystals. A typical way to analyze purity is to use atomic absorption spectroscopy, a slow and destructive analytical technique that does not allow for any high-resolution imaging. In this project, part of an upper-level microscopy course, the goal was to determine if crystals that formed more slowly were indeed more pure. Another goal was to assess whether or not the X-Ray Spectroscopy elemental detector on the Scanning Electron Microscope (SEM) at TRU could be used to evaluate crystal purity in a way that would be quick, non-destructive, and allow visualization of crystals. In the study, dimethyl terephthalate, calcium chloride, and anhydrous

ethanol solution were recrystallized at various cooling rates. This controlled lab experiment combined the practice of organic chemistry and microscopy. Formed crystals were placed inside the SEM for an in-depth examination. Size and structure were compared visually, and elemental analysis was used to assess purity. The experiment showed that recrystallizing at colder temperatures usually generated a purer sample with fewer, but more defined, crystals, whereas the higher temperatures created a less pure sample with more crystals. Additionally, the elemental detector was a highly effective analytical tool for this work. Continued research that eliminates pseudoreplication is necessary to provide more statistically-valid results. This research is important because quantitative SEM of crystal morphology and composition is yet to be explored in-depth, and has potential use in the pharmaceutical industry.

### **The Behavioural Response of Large, Domesticated Ungulates to Small (<2kg) Unmanned Aerial Vehicles (UAVs)**

Atwood, Robert

Unmanned aerial vehicles (UAVs) are becoming increasingly more visible in Canadian skies. Wide-ranging in their capabilities, they are a versatile, cost-effective and safe alternative to many of the tasks currently assigned to manned aircraft. With interchangeable payloads ranging from simple DSLR cameras to complex infrared sensors, their high utility is being explored and sought after by amateur photographers, researchers and energy corporations alike.

Agriculture is one industry in which UAVs are poised to make an impact. From measuring photosynthetic rates of crops with multispectral sensors to locating a calving cow in the dead of winter, technological advances in the field are poised to present a range of inexpensive aerial alternatives to even the most meagre farming operation.

Determining the sensitivity of domestic livestock to probing UAVs may help establish the efficacy of these whirring aerial robots as practical ranching tools. This research project aims to measure the behavioural response of large, domesticated ungulates to drones in order to better assess the potential application of these tools on the farm.

This research project will tentatively pursue the development of a quantitative drone-ungulate interaction scale to which the behavioural response of various domesticated ungulates, including elk, cows and bison, may be measured. We will try to establish exposure thresholds for different species in order to best assess under what set of conditions the use of a drone may be appropriate.

### **Egg Colouration in Mountain Bluebirds (*Sialia currucoides*): A Sexually Selected Indicator of Female Quality?**

Bailey, Jacob

The evolution of conspicuous bright blue colouration of some avian eggs is counter intuitive as it should lead to increased predation and be lost through natural selection. However, this colouration may be maintained through sexual selection as an honest indicator of female quality. Blue pigmentation in avian eggs is generally produced through the deposition of the pigment biliverdin in the eggshell. Because biliverdin is also an antioxidant, blue colouration

produced through biliverdin deposition in eggshells may be a sexually selected signal to the male of the laying female's antioxidant capacity. Males may thus use egg colour as a way to assess the laying female's quality through egg colour intensity and adjust their level of parental investment correspondingly, investing more in offspring of high quality mates. We used digital photography to measure the blue colouration of mountain bluebird eggs and quantified parental investment to investigate whether male birds adjusted their parental investment during the nestling period in response to variations in egg colour intensity. Our results suggest no relationship between average clutch egg blue colouration and parental investment. However, female parental investment is positively correlated with increased egg colour variation within clutches. These findings suggest that egg colour variation within a clutch, rather than average egg colouration, may be an important signal of individual quality.

### **Strategies to Treat Language Problems in ESL Academic Writing: Teacher and Student Preferences**

Balachandran, Meena

This project is a study of the various ways in which language problems of students taking the advanced ESL academic writing course can be effectively treated. ESAL 0580 (Academic Writing) is a Level 5 writing course offered at the ESL Department of TRU. Language errors can be incorrect usage of grammar, vocabulary, punctuation and upper/lower case, incorrect spelling, or a failure to write in an academic style. In this presentation, an analysis of the various language errors and their treatment strategies will be given, along with views from ESL students and teachers. Analysis will also be done on whether there are specific strategies that teachers can use for specific language problems or whether there is a 'one size fits all' strategy that can be used. This research is especially relevant as the ESAL 0580 writing course is the final ESL course that students take before proceeding to their respective academic courses. Students from non-English speaking backgrounds take this course as a way to smoothly blend in with native English speaking students. Hence, it is of utmost importance that the methods used by teachers to give feedback to students about their language errors be effective in helping them to understand and learn from their mistakes.

### **Effects of Red Lake Earth on Cattle Rumen Methanogenesis**

Belanger, Corrie

Farming ruminants contributes to over 25% of anthropogenic methane (CH<sub>4</sub>), a compound which is 25 times stronger at heat trapping than CO<sub>2</sub>, making it the most impactful of greenhouse gases. Because of this, mitigation of CH<sub>4</sub> emissions is critical both environmentally and agriculturally. In this study, the effects of feed additive, Red Lake Earth (RLE), on cattle rumen fluid methane production was observed in vitro. Pure diatomaceous earth, pure calcium bentonite, and mined RLE containing a mixture of these two materials, were tested for their effects on CH<sub>4</sub> production in vitro at concentrations from 2.0 to 100 g/L. After 24 hours of incubation, CH<sub>4</sub> production was measured directly from culture headspace using gas chromatography. RLE treatments were found to reduce CH<sub>4</sub> production by up to 93% compared to untreated cultures, and the 2.0 g/L treatment was selected for 5 day time course studies using rumen fluid from 4 independent animals. Methane production in RLE treated, 5 day cultures was, on average, inhibited by 59% compared to untreated controls. Liquid culture samples were analyzed using quantitative real time PCR (qPCR; 18S and 16S rDNA) and reverse

transcriptase qPCR (*mcrA*) to quantify the effects of RLE on numbers of protozoa, bacteria and archaea in cultures. Volatile fatty acid (VFA) and fatty acid (FA) analysis is being used to evaluate feed efficiency profiles. This research strongly supports the ability of RLE to reduce rumen CH<sub>4</sub> production in vitro by reducing methanogen activity. Ongoing research is using sequencing-based methods to characterize specific changes in microbial communities upon exposure to RLE.

### **Assembly and Annotation of *Gordonia* sp. NB4-1Y Genome Version 2.0**

Bergstrand, Lee

McInnes, Matt

*Gordonia* sp. strain NB4-1Y has been shown to be a degrader of polyfluorinated organosulfur compounds (PFCs), in particular 6:2 fluorotelomer sulfonate (6:2 FTS). 6:2 FTS and similar compounds are used as surfactants, fire-fighting foams and lubricants, and have been found to have toxic effects. PFCs degrade slowly and bioaccumulate in the environment, so discovering the process by which NB4-1Y degrades 6:2 FTS is of interest. In 2013, a draft genome sequence for NB4-1Y was published and is being used in combination with transcriptomic and proteomic studies to characterize the 6:2 FTS degradation pathway. However, this draft genome is not of sufficient quality to identify pathway genes as it is made up of more than 2300 contiguous sequences (contigs) with an average of 2.5 genes per contig. Recently, a 400 base pair whole genome shotgun was generated using the IonTorrent sequencer at TRU that has been assembled into 173 contigs. The goal of our directed studies is to create a second generation draft genome with improved quality by testing a variety of genome assemblers that allow us to combine the new sequencing data with the 200 bp data used to produce the first version of the genome. We will also evaluate commercial cloud computing infrastructure to determine if it should be used for current and future genome assemblies. This new draft genome will also be uploaded to the National Center for Biotechnology Information's Genbank so it can be used by other scientists.

### **BioMagick: A Next Generation Bioinformatics File Format Converter**

Bergstrand, Lee

McInnes, Matt

With the democratization of next generation sequencing (NGS) technologies over the past decade, the cost of genome sequencing has dropped drastically making sequencing an ever increasingly attractive analytical method for biologists and medical professionals everywhere. To counteract this new torrent of biological data, bioinformaticians have begun to develop bioinformatic pipelines which are designed to automate the processing, filtering and analyzing of genomic sequencing data. Pipelines often consist of several bioinformatics tools in series, with the output from one bioinformatic tool being passed along to another tool. Each step in the pipeline transforms the sequence data into a more useful form. Commonly, pipeline tools are developed independently and create output files incompatible with other tools in the system. As a result, custom "glue" code has to be developed in order to transform the output file format from one tool into an input file format compatible with another. BioMagick, the software we are developing in our computing science directed studies course, is a bioinformatics file format converter designed to replace a pipeline's custom "glue" code with an easy to use command line program allowing bioinformaticians to experiment with and build new bioinformatic pipelines

faster. Our tool will be able to auto-recognize text and binary Bioinformatics file formats and to convert these formats to other formats autonomously. An automated testing regimen will be created to validate BioMagick. BioMagick will be open sourced and released under an MIT Licence.

### **Computer Vision for Autonomous Navigation**

Bo, Han

Buckley, Alex

Computer vision is a field that acquires, processes, analyzes, and understands images from the real world and generate numerical and symbolic information from the images. Applications of computer vision have been used for autonomous vehicles and robots, face recognition, optical character recognition, and remote sensing. The proposed research explores possibilities of using computer vision for the autonomous navigation of Miniature Aerial Vehicles (MAVs) using OpenCV (Open Source Computer Vision), a library of programming functions for real-time computer vision. This research examines colour/object detection and analyses of stream video, and applies them to autonomous navigation with a physical demonstration using an AR Drone. The outcome of this research can be used for rescue missions and/or surveillance for public safety using MAVs.

### **Do Female Mountain Bluebirds (*Sialia currucoides*) Adjust Offspring Sex Ratio in Response to Male Attractiveness?**

Bonderud, Erica

Brood sex ratio adjustment, in which the female alters the sex ratio of her offspring in response to external and self-cues, is a well-documented phenomenon in songbirds. While the physiological mechanisms behind how females perform this task remain unclear, the cues signaling her to do so are better understood. For example, some species adjust brood sex ratios in response to mate and habitat quality, producing more males when paired with higher quality mates or in higher resource availability. The purpose of this research was to investigate factors affecting brood sex ratio adjustment in mountain bluebirds (*Sialia currucoides*); specifically, we asked whether females adjusted brood sex ratios in response to male plumage colouration. This study was performed using four years (2011-2014) of data we collected from a population of mountain bluebirds in the Knutsford area of Kamloops, BC. Brood sex ratios were determined through polymerase chain reaction (PCR) analysis of nestling DNA samples, and male plumage colouration was quantified using reflectance spectrometry. Females mated with attractive males (bright plumage) were predicted to produce male biased broods, while females mated with unattractive males (dull plumage) were predicted to produce female biased broods. Brood sex ratio adjustment has not yet been investigated in mountain bluebirds, therefore this research provides new insight into the breeding ecology of this once threatened grassland species.

## **Alpine Ambiguity: Reconceptualizing Skiing's Place in British Columbia**

Braidwood, Jessica

Mountains inspire numerous groups of people to develop senses of place in themselves, and one of the ways that many do so is through skiing. The result, in British Columbia, is the establishment of several destination ski resorts on unceded First Nations territory. The dominant structures and discourses that flow throughout these ski resorts and the mainstream media assumes affluent settler-skier tourists and their way of knowing as the only legitimate way to occupy and manage these mountainous areas. This works as a powerful force of exclusion and oppression, covering First Nations unceded territory up with lodges, gondolas, tourists, and ski area boundaries. In this presentation, I will examine how these discourses work through a case study of indigenous-settler relations in the mountains of the Skwelkwel'welt—an unceded territory inalienable from Secwepemc people's identity, yet illegally paved over by Sun Peaks Resort Corporation in the making of a ski resort.

Unpacking ski resorts as structures that reconstitute power relations affords us the opportunity to identify gaps that exist within a colonial framework—the failures of a neoliberal, capitalist, colonial structured ski resort to attend to the multiplicity of ways of knowing and being in mountain places. Through this analysis, we can understand these mountains as more than benign, pristine wilderness open for tourists to recreate, but as layered places where a complex political ecology lives. From there we can work towards nurturing Native-settler relations that move past oppositional and create mutually respectful relations in these mountains.

## **Believing Is Doing? Weighing the Costs and Benefits in Responding to Emotionally Evocative Situations**

Briner, E.L.

People can choose from many different strategies to regulate their emotions. Some strategies have more positive outcomes for well-being than others. However, few studies examine why people choose one strategy over another in a given situation. Furthermore, little is known about beliefs concerning the costs and benefits of different strategies to health and well-being, and whether these beliefs play a role in the selection and implementation of particular strategies.

One hundred and seventeen undergraduates completed a questionnaire examining individual preferences for emotion regulation strategies in nine emotionally evocative scenarios. They rated how intense and pleasant their feelings were in each situation. Finally, they rated the extent to which they believed each strategy to be effortful, to reduce negative feelings, physical changes, and facial expressions of emotion, and to increase overall well-being. Participants also reported on their happiness, life satisfaction, perceived stress, and psychological well-being.

I am using quantitative statistical methods (including regression), to analyze the data. The findings will show the extent to which beliefs about the consequences of emotion regulation strategies (i.e., strategies for reducing negative feelings and having positive health outcomes) predict preferences for different emotion regulation strategies and well-being. The study will therefore add to our understanding of the variables that guide people's emotion regulation choices. Future research building on the findings could be directed towards facilitating adaptive emotion regulation choices.

### **Fusion and the Circle of Life: Demonstration and Participation**

Charlie, Jason

Through naturalistic observation and analyses of the powwow dance, I was able to witness Native epistemology, first hand. In this paper, I will explore this epistemology. The teaching method of Native culture is their ontology, and has been passed from generation-to-generation, and is their way of life; it is a way of showing and doing –providing essential life skills. This practise – a way of living – emphasized the importance of communication, cooperation, and interaction. In that sense, there are other underlying dynamics – the energy – presenting itself to the enhance peoples' wellbeing through their interrelatedness, their interdependence, and their interconnection. In their ceremony, nothing is as it seems; the energy generated underneath, while dancing, brought the Indigenous people together in unity. And, from another perspective, the reuniting of the people fulfilled, through action, psychological needs by conversion of energy. Native epistemology also permits children to discover life for themselves – to explore and create their own paradise, in conformity with the Sacred Circle, like their ancestors – dancing and creating their own universe.

### **Determination of Triclosan in Personal Care Products and Swimming Pool Samples by Liquid Chromatography-Mass Spectrometry**

Chattu, Devin

A sensitive, rapid LC/MS method was developed to detect triclosan in personal care products such as toothpaste, liquid soaps, facial cleanser, and cut cleaner, as well as public swimming pool water samples using a C-18 column. Triclosan is a widely used antibacterial agent, and its effects on human health are controversial. It is a known endocrine disrupter, however; not enough information is known about its potential hazardous effects on human health to justify a boycott of all triclosan containing products. It should be noted that industries are pushing towards avoiding the use of this chemical. As an active bactericide, very minute quantities of triclosan can pose a severe risk to marine life in aquatic ecosystems as well. The detection of triclosan in personal care products and swimming pool water samples will hopefully urge consumers to reduce or avoid the use of triclosan containing products. In this research, experimental conditions such as column temperature, solvents, flow rate, solid phase extraction, and experimental procedure, were all optimized to find the best experimental conditions for determining triclosan in the samples. Using the optimized conditions, several personal care products and swimming pool samples would be analyzed to find out the levels present in them and compare the resulting values to the manufacturers' claims, as well as the maximum allowable concentrations for triclosan in these samples.

### **Blue Humor: A Story about Comedy, Discrimination, and "Fat Kids"**

Colbourne, Zack

Set in the muddy, eclectic suburbs of Surrey, this is a semi-autobiographical story about the tools available to children growing up in a multicultural, globalized society, and the things they can do with those tools. When the pensive and overweight young Louis moves back to the city, he finds himself unable to fit in with the tough, stoic crowd of boys in his grade. Annoying them more with every attempt, and with little support from his caring yet preoccupied parents, Louis



soon resorts to crueler, harsher measures to get the boys on his side, teaching himself the barbed wit of the television he watches obsessively, and becoming one of them by appealing to their sense of mischief and chaos. The resulting mayhem and its consequences paints a picture of a culture which cultivates and necessitates detachment and distance from the feelings of others, whether it be in regard to their differences or similarities. In staging these events from the view of older children, within the cultural smorgasbord of Surrey, I intend to present a sketch of the DNA of the culture of irony and removal, a sketch that captures the culture as one stemming naturally from a need to process an increasingly dense, information-laden world - and their propensity for cruelty as a byproduct of this disengagement.

### **Analysis of Triglycerides in Cooking Oils Using MALDI-TOF Mass Spectrometry and Principal Component Analysis**

Cooley, Kevin

Triglycerides are composed of three esterified fatty acids bound to a glycerol backbone, and are the main component of several types of cooking oils. They are biologically important molecules in that they serve as an important source of energy. The analysis of lipids using other forms of mass spectrometry has proved difficult due to the large degree of fragmentation observed in the ionization process, thus stressing the importance of the development of a new method. In this study the analysis of these triglycerides in nine common cooking oils was conducted using matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry. Using 2,5-dihydroxybenzoic acid (DHB) as a matrix, intact triglycerides were successfully identified in all nine cooking oils with little fragmentation. Principal component analysis (PCA), a chemometric technique used to identify underlying similarities and differences in a set of data, was used in conjunction with MALDI-TOF mass spectrometry. The application of PCA to the mass spectral data obtained from the MALDI-TOF mass spectrometer allowed for further comparison of the underlying properties and components of each cooking oil. It is expected that if the results from PCA show noticeable differences in particular oils, the MALDI method will also be able to discriminate between these differences. If successful this MALDI method can then be used to identify unknown oil samples or provide quality control in commercial settings.

### **Exploring Culturally Sensitive Alternatives for Aboriginal Justice**

Corby, Brittany

In this presentation I will explore culturally sensitive alternatives for Aboriginal justice in Canada. The Canadian judicial system has had a long standing troubled relationship with Aboriginal peoples that is reflected in the over-representation of Aboriginal peoples within the Canadian criminal justice system. This presentation will begin by examining the colonial building blocks of upon which the Canadian justice system is founded, noting the 'built-in' barriers that this system creates for Canadian Aboriginal peoples. From there, I will examine potential alternatives to our current justice system that come directly from that of Aboriginal peoples themselves. While keeping in mind that notions of justice and law are culturally constructed, I will examine the cultural values upon which the current system is based and contrast those values with that of Aboriginal peoples. By exploring alternatives such as sentencing circles, elderly and community sentencing panels, sentencing advisory committees, and community mediation projects, and be using as case studies existing programs such as the Community Council Project, an Aboriginal-

run diversion program based in Toronto, I will to reflect on a better understanding of what culturally sensitive alternatives for Aboriginal justice look like from an Aboriginal perspective, and what benefits they may offer.

### **Place-Making in the Mountains of the South Interior**

Douglass, Leif

Places are not simply the sites where our lives happen. Rather, they are made, produced and contested processes that happen, take place. They are both highly personal and collectively shared. Places are also inherently political as cultural values and power relations are built into, and reconstituted, through place. The very possibilities of place are constrained by structures of power and the dominant cultural imagination. This presentation uses a personal natural history essay as a starting point to explore the link between people, landscape, and the complexities of place-making. Specifically through interrogating my personal connection to place in the South Interior of British Columbia, this essay is an engaged personal reflection and examination of my relationship with what I have seen as a particular kind of place—"the natural world." By way of this reflection, this presentation questions our relationships with place, specifically in those places seen as 'natural,' and opens up space for thinking about the complexities of place-making, personally and collectively.

### **Content Analysis of Psychosocial Well-Being in Health Care Professionals through Online Discussions**

Dulay, Sunny

Disruption to psychosocial well-being among health care professionals is a growing issue that has yet to be adequately researched. Statistics suggest that depression is high in doctors, along with other mental health concerns. Despite their training in identifying mental illness and supporting affected individuals, health care professionals may be unaware that colleagues are facing challenges to their psychosocial well-being. In addition, little attention has been given to how health care students manage their mental health as they navigate learning to care for patients. As such, research is needed to improve understanding of the specific issues facing health care professionals and students, and how they encounter mental health concerns with respect to their work. This presentation will describe a qualitative analysis of data from online forums for health care professionals and students focused on discussions of psychosocial well-being. Content analysis was used to examine posts from the online forums for what they reveal about specific experiences and their meanings. Analysis identifies how health care professionals and students describe their psychosocial well-being relative to working in health care, thus identifying common concerns across individuals. The research thus provides insight into experiences with negotiating psychosocial well-being, and findings can be used to improve the support and resources available to this population who may face disruptions to well-being due to the stressful and complex nature of their work. Furthermore, the research can encourage dialogue on mental health issues, which can decrease stigma and facilitate supportive interactions.

### **Developing Sport-Confidence in Gymnastics Athletes**

Erickson, Breann

The purpose of this research is to create a coaching guideline on how a coach can develop the leadership qualities necessary to build and develop psychological hardiness and sport-confidence in gymnastics athletes. The work is significant because sport-confidence is recognized to be one of the most important determinates in sport performance. The majority of research on sport-confidence is theoretical based. The reason for this research paper is due to the lack of practical knowledge available on how to develop sport-confidence within athletes. The aim of the study is to compile resourced information into a single document to be implemented by entry-level coaches as a step-by-step guideline to help develop an athlete's psychological hardiness and sport-confidence. Within this presentation there will be examples of what to say and how to say it, as well as exercises to help take the theory and put it into practice.

### ***The Womanish-Man and The Man-Woman: Cross-Dressing in Early Modern England***

Megan Fenkhuber

The focus of this paper was on two pamphlets written in 1620 entitled *Hic Mulier or The Man-Woman* and *Hæc-Vir or The Womanish-Man*. The first is in the voice of a man denouncing female cross-dressers, and the second is in the voice of woman defending her choices. The idea that the clothing you wore made your gender and role in society, as well as the belief that the mother passed down her traits to the child through nursing was what made these cross-dressers so offensive. Punishments varied across Europe even though it wasn't illegal to cross-dress. In England, it was automatically assumed the women were prostitutes. It has been argued that the events outlined in the pamphlets were caused by female members from an early form of middle-class protesting these ideas. There is also evidence of women cross-dressing for a variety of other reasons. As for the men who crossed-dressed, most of them did it in a professional capacity as actors on the stage. This was romanticized, and it has been theorized that it allowed men to experience homosexual desires in a safe environment without overtly acting on them.

### **First Nations Courts: Utilizing Canadian Legislation to Implement Restorative Justice for Aboriginal Offenders**

Friend, Jennifer

In 1996, the Canadian government implemented reforms to the Criminal Code regarding sentencing in an attempt to reduce the overpopulation of Indigenous people in the judicial system, a problem which was seen as partly a result of colonialism and systemic discrimination. Included in these amendments were the restorative justice principles of reparations and responsibility, and a requirement for sentencing judges to consider reasonable alternatives to imprisonment, especially for Indigenous offenders. Unfortunately, a review of the recent literature indicates that judicial reform and sentencing innovation have failed to mitigate the overrepresentation of Indigenous people in the incarcerated population. It is apparent that what these reforms have failed to address are the broader systemic issues, such as poverty and lack of education, that contribute to the high incidence of Indigenous people committing criminal offences. Restorative justice has many goals, including enhancing accountability for one's actions, increasing voluntary dialogue, and reconnecting the individual with the traditional

community. However, these actions also need to be targeted at preventative measures, rather than focusing on sentencing and offender reintegration. Thus, in order for a restorative justice approach to legal issues to be effective, social workers have an obligation to strive for the creation of more programs specifically targeted at Indigenous people, especially those for women and youth.

### **Understanding Eco-Tourist Motivations: A Case Study of Borneo's Eco-Tourism Industry**

Fuoco, Drew

This research project analyzes data gathered from tourists in Borneo in order to better understand their motivations for participating in eco-tourism products, specifically those in Sabah, Borneo. Eco-tourism itself is a well-studied subject, with the literature discussing in detail the different definitions of eco-tourism, what qualifies as an eco-tourism product, and how issues such as "greenwashing" affect the industry as a whole. More recently has been the examination of motivations for tourists engaging in eco-tourism activities, and how their values and beliefs may offer insight into the differences between them and a standard tourist. However, research into this topic of study is incomplete; several smaller studies have been conducted but more varied research is needed to form a broader generalization of what constitutes an eco-tourist and informs their motivations. This case study was conducted by administering questionnaires to tourists participating in eco-tourism activities in Sabah, Borneo; the questions focusing on themes such as knowledge, behaviour, and motivations of the tourist. By comparing these results with existing study's, conclusions can be drawn reaffirming that eco-tourist motivations are distinct from other tourists While this particular case study is not conclusive of the entire eco-tourism industry, it is a strong contributor to the growing field of research regarding eco-tourist motivations, as well as an indicator that further studies need to be done to allow for greater generalizations in this field of study.

### **Settlers and Survival Sex: The Effect of Colonialism on Aboriginal Women in the Sex Trade**

Giles, Andrea

This research project explores the issue of sex work in Canada, and more specifically the overrepresentation of Aboriginal women engaged in sex work as a survival strategy. The corresponding risks associated with "survival sex" leave many women extremely vulnerable. If we are to understand the complexity of this vulnerability, and we have to if we hope to address the issue of so many murdered and missing Aboriginal women in Canada, we need to pay attention to the lived experiences of colonialism. This means that we need to consider historical traumas, loss of identity, culture, and spirituality. We need to consider the conditions that result in the overrepresentation of Indigenous women engaging in sex work. And we need to explore the societal forces of racism, over sexualization of Aboriginal women, and systemic marginalization that often leaves women with limited options for survival. Lastly, in this presentation I will investigate how the implementation of new prostitution laws in Canada will affect Aboriginal sex workers and impact their potential future involvement with the criminal justice system. I believe that this area of research is vital because the number of missing and murdered Indigenous women in Canada is unacceptable. We must strive to understand the reasons behind their vulnerability so we that can make positive changes in order to prevent further lives from being lost.

### **Cold Constructs: Creating a Society of Fear in the 1960's**

Gonzales, Lachlan

One of the most fascinating times in the development of the United States of America was the 1960's. During the time of the Civil Rights movement, the Cold War and war in Vietnam, the United States was undergoing a dramatic change. This paper will focus on the evolution of society during the 1960's, proposing that these changes were directly aided by several agencies of fame, including the CIA and the FBI as well as the RAND Corporation, which was involved in numerous fields of research. Many of their various operations, classified experiments and projects were designed to either control or eliminate various people, ideals or parties that were deemed a threat to America. Thus they created a society in United States that was based on mistrust, fear of the government, and the fear of the foreign. Furthermore, this fractured the general populace and those in the government, who did not know whom they were able to trust. These agencies willfully broke American law, claiming that this was in the best interests of the American People. The CIA, FBI and RAND operations, experiments and acts that were directed at the people, allegedly for the people, attempting to control and construct a society that was based upon ideals desired by these agencies. These actions on persons and society using various means, including torture and experimentation, violated the rights of the people and the individual, time and time again. This paper will also briefly look at modern day American society and postulate links as a result of the actions of these agencies.

### **And on that Stereotypical Bombshell ... A Critical Analysis of the use of Essentialism in the TV Show**

*Top Gear*

Helfrich, Lyndsay

Popular media plays an important role in the lives of many people. Not just news media, but everything from television shows to music and magazines. It reaches so many people it then becomes something interesting to analyze in academia. The field of intercultural communication is no different, as much is communicated through popular media, especially considering the wide variety of media that covers topics relating to cross cultural interaction. In television for instance, many shows have characters that are supposed to represent a different culture. Often times, that person is there representing the stereotype of that culture in one way or another. Most of the time this is for comedic purposes and is not meant to offend people, but it still conveys certain messages to people and reinforces stereotypes. Stereotyping is usually a negative action, but in many cases it is unavoidable, and sometimes unconscious. In this presentation I will analyze the use of cultural stereotypes in media for humorous purposes, mainly by analyzing a clip from the British Broadcasting Corporation (BBC) television show *Top Gear*. In doing so I will critique this use of essentialism.

### **The American Lie: Western Education and the Myth of Meritocracy**

Herbert, Christopher

Most Canadians would agree that we live in a meritocratic nation, meaning that our hard work will be met with financial, social, and political rewards; the more effort a person puts in, the

more valuable these rewards will be. However, when looking at sociological data, it becomes clear that our society is riddled with inequalities, which prevent many individuals from climbing the social hierarchy, in spite of their efforts. The research conducted for this project suggests that meritocracy works in theory; however, when it is applied in practice, not only does it not work, but has always been an illusion. This becomes apparent when focusing on the growing gap between the wealthiest and poorest members of our society. Though there are many factors restricting meritocracy from being a reality, this research examines the role the education system. By analyzing Shamus Khan's ethnography *Privilege* and comparing it to other sociological literature, this paper will demonstrate how the education system supports inequalities among people at an early age, despite the effort individuals apply to their studies. The research examines the relationship between private boarding school attendance and 'prestigious university' enrollment, and how these schools differ from public schools and universities considered to be less 'prestigious.' Due to the fact that class inequality intersects with most other kinds of inequalities, gender and race will also be examined for the purpose of this research. Although this research focuses exclusively on the education system, any social institution can be used to demonstrate the myth of meritocracy.

### **Do Self-Focused and Matching Styles of Affect Labeling Produce Different Subjective Emotional Responses?**

Hodgson, Lisa

Labeling one's emotional experience (affect labeling) is thought to have beneficial consequences for emotional experience, facilitating subsequent regulation of emotion and reducing the intensity of one's emotional response. However, in previous studies, researchers asked participants to label the emotion in an external stimulus, or match their emotional experience to a provided label. These processes may facilitate distancing from the emotional experience and hence reduce the subjective experience of emotion. In contrast, affect labeling by attending to one's internal state may actually increase emotional experience. In this study, participants were randomly assigned to engage in one of two forms of affect labeling, a matching method (where they matched their emotional experience to a provided label) and a self-focused method (where they simply turned their attention inwards and noticed and labeled their affective state). As in prior research, the matching condition should result in a decrease in emotional experience. However, the self-focused method should result in increased emotional experience. Furthermore, participants in the matching condition are expected to feel more distant from their emotional experience while the self-focused group will be more immersed in their emotional experience. Data will be analyzed using repeated measures analysis of variance and findings will be discussed in light of prior research on affect labeling. Understanding the consequences of the different forms of labeling is important when drawing inferences from affect labeling experiments to techniques that people may use in everyday life or in clinical settings, such as mindfulness based therapy.

### **Change through Understanding: A Reflection on Homelessness, Public Perception, and Solutions**

Howes, Erica

Is a better future possible? Every year in over 200,000 Canadians experience homelessness. More than the cold, the starvation, and the extreme living conditions, they face harsh judgment

and discrimination within their communities. But who are the homeless? What factors impacted their current situation? And what is being done to move forward? My research aims to uncover the answers to these questions. By analyzing the number of homeless against different demographics and by the showing the impact of systemic policies, the research outlines the vast effects of homelessness, and the needless cost to tax payers, to social services, and to the people living among this vulnerable population. Change is needed, but who impacts that change? My research digs deeper into the commonly held societal biases against homeless people, in the hopes of finding the truth behind those prejudiced beliefs. Research gathered from hospitals, emergency shelters, government statistics and personal accounts illustrates the preconceptions held by members in our society towards the homeless. This research allows us to look deeper at the meaning and realities behind these judgments (from laziness, abuse of the system, to the over-representation of First Nations People), and how those labels impact and keep individuals from accessing the supports they need. This will only be starting the conversation, but only by attempting to fully understand the current homelessness situation can we hope to impact the policies that will help bring about change. After all, don't all Canadians deserve a chance?

### **Pathologizing Postmodern Fiction: The Rise of Disease in Literature and How This May be Useful**

Hrycan, Erin

The postmodern novel is often described as upsetting the traditions of literary structure and content. *Barney's Version* by Mordecai Richler and *Jpod* by Douglas Coupland are no exceptions to the new rules constructed by postmodern fiction. This paper sets out to identify examples of postmodern techniques used in these works to bring light to the effects of disease on personal narrative. This essay elucidates the two authors' use of intertextuality, protagonist amorality and episodic narrative to create a postmodern text that adds value in understanding the relationships among society, culture and health. The amplification and misperception of disease will also be taken into consideration.

All of this may be useful in helping us understand the true effects of disease on personal narrative and also in helping us question our own actions and misperceptions when dealing with illness in our own society. There is value in applying this kind of scholarly attention to works of literature in order to better understand individuals suffering from illness and to better provide them with healthcare. Autism and Alzheimer's are two brain diseases that are highly prevalent today, but about which we lack understanding other than what we learn through the media. Literature, in this way, becomes useful in supporting ideas about the nature of the society.

### **Development of a Serious Virtual Reality Videogame to Aid in ACL-Injured Patients' Rehabilitation Program**

Jin, Hao

Anterior cruciate ligament (ACL) injuries are very common during sports such as soccer, skiing and American football. ACL-injured patients always need a proper physical rehabilitation program to enhance mobility and strengthening muscles related to knee support. This rehabilitation program is of paramount importance for ACL-injured patients to consistently follow in order to get back to their pristine knee fitness. Since the uses of VR videogames to

improve health outcomes are a burgeoning area of rehabilitation research, I developed a serious virtual reality (VR) interactive video game for the purpose of helping ACL-injured patients stick to their physical rehabilitation routine, and helping ACL physical therapists monitor and assess their patients' rehabilitation progress. This game was developed using Unity3D, and a Kinect was used to track body movement. I plan to hire a few students to do the usability test, and hope to find out the usability, playability, and effectiveness of this game.

### **Aboriginal Tourism Business Plan**

Johnston, Jason

Focused on Aboriginal tourism in a First Nations community in Central Ontario, this presentation will describe the methodology behind and development of an interdisciplinary tourism business plan. It is my desire to create a business that offers visitors the opportunity to learn more about Aboriginal culture through experience-based activities, as well as allowing for an increased cultural awareness within the community itself through elders' teachings and story-telling. The business plan business plan will be completely ready to for implementation by the end of April 2015; it is expected that project described will increase cultural awareness as well as bring revenue into the community.

### **The Influence of Host Quality on *Coleophora deauratella* Larval Abundance and Growth on Red and Alsike Clover**

Jorgensen, Amanda

The red clover casebearer moth (RCCB), *Coleophora deauratella* (*Lepidoptera: Coleophoridae*), is an invasive red clover pest introduced to Canada in the 1960's. The larvae feed on developing seed from June to late August, then overwinter in crop debris. RCCB can cause seed yield losses of  $\geq 80\%$  in second-year seed stands of red clover. There are no registered pesticides for RCCB. Both larvae and adults have been reported in alsike clover fields but little damage is seen on these plants, and female moths display lower fecundity on alsike clover. Larval abundance in red and alsike clover seed crop fields and volunteer clover patches were compared. Host quality was determined by rearing field-collected larvae on laboratory-grown clover flowerheads and observing growth and development. No larvae were recovered from alsike clover fields or volunteer alsike patches, while 338 larvae were recovered from red clover fields and volunteer patches. Larvae reared on red clover for one month gained more weight overall than larvae reared on alsike clover. This suggests that the difference in damage and fecundity may be due to lower host quality.

### **Potential Use of Unmanned Aerial Vehicles (UAV's) in Vineyard Management**

King, Benajmin

Since the development of the GoPro franchise people have looked for the next best form of technology to record their lives. The use of Unmanned Aerial Vehicles (UAV's) also referred to as drones, has become the next big thing, with the ability to attach a GoPro to them people are thoroughly enjoying the possibilities. Drones or UAV's were originally used for military purposes; however, the application for research of wildlife, agriculture, and range use has been



growing within the last decade. In this study I will determine the practical uses of drones in vineyard management. I am using a standard RGB camera as well as a multispectral camera along with the DJI 'Phantom 2 Vision +' drone. After collecting images from Harper's Trail Vineyard, outside of Kamloops, BC, I will use a mapping software called Pix4D Mapper to create 3D maps showing elevation changes and allowing for precise measurements of the vineyard. I will also be looking at determining the health of the grape vines, *Vitis vinifera*, and any differences between the varieties grown on this vineyard. As the study is taking place during the winter season, January to March 2015, when the vines are in their dormant state, it will determine the capabilities of this technology while plants are not in their optimum stage of life. Through this study I hope to encourage further research with this technology as the possibilities are near endless.

### **Tourism Employees' Motivations and Satisfaction across Cultures: A Case Study of Workers in SunPeaks, B.C. and Sabah, Malaysia**

Lai, Queenie

This research project was undertaken in Malaysia with the goal of understanding employee motivation and satisfaction in a tourism setting. The B.C. Tourism and Hospitality Industry relies heavily on foreign workers or new immigrants to fill gaps in the job market. With such a high number of jobs to fill, understanding how cultural differences affect the motivations of these workers can increase staff retention for businesses. A series of interviews were conducted with employees of Borneo Eco Tours and Sukau Rainforest Lodge in Malaysia, and those results were compared to a study into employees' "sense of place" at Sun Peaks Resort in British Columbia. The latter study shows that although there are a surprising number of similar key factors that motivate employees and affect their satisfaction, there are also many differences that can be linked to a disparity in cultural values. Understanding how these cultural differences affect the motivations and satisfaction of employees in a tourism setting can allow businesses to prioritize and better train their staff, inherently leading to lower staff turnover rates. The research also offers insight into the similarities and differences in values and lifestyles of people from different cultures.

### **The Voice of Transgender Sex Workers in Relation to their Experiences in Health Care**

LePage, Rachel

Scott, Kirsten

The purpose of this research project is to document the personal experiences of transgender sex workers (TSWs) in dealing with the healthcare system. Healthcare professionals (HCP) exposure to sex workers or transgender people is limited, and often when exposed to this population HCP do not know the proper way to behave. This can lead to TSWs not feeling safe to access healthcare, which can have adverse health outcomes on TSWs. Grounded in phenomenology and thematic analysis, phase one of this research involved collecting data through interviews with TSWs to explore the positive and negative experiences TSWs have had in regards to their involvement in healthcare. During phase two of the research, a thematic analysis will be conducted focusing on a series of themes that were identified through interviews with TSWs, and any gaps or barriers to TSWs care will be explored. The conclusions drawn from the research will lay the foundation for recommendations and suggestions to be made on how HCP can help to provide a safe, supportive health care environment for TSWs. This will foster a better

understanding of this unique population, and assist in equipping HCP with the knowledge they need to provide competent care.

### **A Mango for Every Palate: Food as Identity in Madhur Jaffrey's *Climbing the Mango Trees***

Little, Ariel

In her book, *Climbing the Mango Trees: A Memoir of a Childhood in India* (2006), Madhur Jaffrey, one of the most prominent Indian culinary authorities, illustrates how memory and the past are often best encapsulated by food. Jaffrey's memoir is well timed, as food culture is a burgeoning field of academic study due to the acknowledgment that food is an indicator of culture, geography, and time period. Culture and food are inextricably intertwined and, as Jaffrey reveals, food culture can be the ideal place for the expression of identity. Jaffrey does acknowledge how much cultural, and especially religious, identity shapes one's diet, yet she also exposes how cuisine is where her family expressed their cultural hybridity and how diet is inevitably altered to the individual's palate. These factors enable food to become an acceptable field for experimentation for Jaffrey, ultimately allowing her to adopt a culinary cosmopolitanism and consequently a multicultural identity distinct from her communal one. However, Jaffrey does not abandon her Indian character, choosing to maintain her culture through embracing Indian cuisine once abroad. For Jaffrey, food's dual nature, as both an important cultural signifier and an acceptable field for experimentation, renders cuisine the ideal method for enabling Jaffrey to develop a multicultural identity while still maintaining her heritage. This presentation will demonstrate the significance of food culture studies by exploring Jaffrey's depiction of food as a flexible medium for expressing the various types of identity.

### **Exploring Better Explanations for Alcohol Abuse by University Students**

Long, Robert

There is an unusually high rate of alcohol consumption and abuse amongst college and university students when compared to non-students of a similar age. Several studies have tried to explain this discrepancy, but most of them rely entirely on self-administered questionnaires and anecdotal evidence. Conclusions drawn from studies that rely solely on the insight of those being studied are not very reliable. In order to create effective strategies that reduce the harm of alcohol use and abuse in post-secondary schools, a better understanding of the root causes of drinking in excess is necessary. This paper provides a starting point for a different direction in research on alcohol abuse in post-secondary institutions. By examining the similarities between students and groups of people who experience socioeconomic and mental health challenges that factor heavily into alcohol abuse, this paper challenges traditional answers as to why students use and abuse alcohol. The findings suggest that while the traditional answers (such as peer pressure and easy access to liquor) are not completely wrong, there is an explanation that is more congruent with modern addictions studies: students experience levels of poverty, stress, and a lack of healthy coping mechanisms that have been shown to be strongly correlated with addiction.

## **JavaScript Framework for Three-Way Data Binding**

Lu, Junqing

In web applications, the user interface is usually rendered in the client side. For a better user interface experience, some JavaScript frameworks started including two-way data binding in which data in “Model” is updated at the same time with corresponding elements in “View”. In this way efficient coding and better user interface experience can be achieved. In three-way data binding, data in server-side “Model” is updated at the same time with data in client-side “Model”, and elements in “View”. Three-way data binding is even more significant than two-way binding, for more efficient coding and a more elegant user interface experience. Nevertheless, only a few JavaScript frameworks have started considering an option to include the three-way data binding. One of the reasons for this is that the rendering location of user interface with three-way data binding is not yet well defined. This research will investigate an efficient method for how three-way data binding can be supported in the web application environment of HTML5, CSS3, JavaScript, PHP, and MySQL. The three-way data binding will be implemented and its performance will be analyzed.

## **How to Kill in the 21st Century: The Resurgence of Mercenaries on the Battlefield**

Maher, Eric

This paper proposes to show that the return of mercenaries is due largely to the shift of infantry warfare from large pitched battles to small skirmishes. This research analyses the historic reasons for employment of mercenary companies, including their self-sufficiency, high levels of combat experience and diverse specialization in different fields of combat. The era of the mercenary of antiquity sees its end with the rise of the musket. It is this invention which causes drastic change to the dynamics of the battlefield, rendering mercenary companies obsolete. However, the world has seen a massive resurgence of private military companies, with the dynamics of warfare once again turning to a battlefield requiring individuals who possess the same characteristics of mercenaries past. Addressing this past and comparing it to the present, we see that mercenaries are not a new phenomenon no matter what label is applied, and that mercenaries will continue to remain a consistent part of warfare until technology once again renders them obsolete.

## **Square Pegs and Round Holes: Stories within Stories**

McCabe, Rod

We are stories. We concoct stories, and we inhabit stories. And we tell stories to find our place in story. The stories we tell and the stories we inhabit are not separate and distinct, though. There is an interrelation between the stories we create and the stories we inhabit. We create our stories from within the stories we inhabit. And when we find ourselves inhabiting an unfamiliar story the experience is most discomfiting. To avoid this discomfiting experience we thus tend to focus our efforts on creating a personal story that fits the paradigm with which we are familiar. There is comfort in familiarity. Whether that familiarity is with the paradigm of the story we inhabit – the general – or whether that familiarity is with the story we create – the specific – it is through story that we find our being. The more snug the fit of the story we create and the story we inhabit, the more comfort we find. Unfortunately, this fitting of stories is akin

to the fitting of a square peg in a round hole. However the snugness of fit, the security is tenuous at best. There are gaps and frictions that ever threaten the sureness of place. This paper looks at two literary works, *Barney's Version* by Mordecai Richler and *Green Grass, Running Water* by Thomas King, and compares approaches taken in creating and inhabiting stories and to gain insight into our own roles as both.

### **Tuition Waivers for Former Youth in Care: An Equalizing Opportunity that Thompson Rivers University Should Adopt**

McParland, Katherine

This presentation analyzes how tuition waivers for former foster youth have been implemented at universities in response to the B.C. Representative of Children and Youth's challenge to post-secondary institutes. Youth aging out of care suddenly lose all their supports with an abrupt transition to independence that recreates the trauma of apprehension. Many former youth in care do not have family privilege and end up homeless, addicted to substances, on income assistance, unemployed, and incarcerated. Furthermore, some studies show 50% of youth aging out do not have a high school diploma and less than 6% earn a two or four year degree. This study researches barriers to completing post-secondary education, and how tuition waivers can increase possibilities for former foster youth. An environmental scan analyzes existing support programs and the eight B.C. post-secondary institutes that have adopted the tuition waiver for former foster youth. It also encompasses tuition waivers in Manitoba, Ontario, and the United States, where programs have been created that support a successful transition to university for foster youth. This research will inform recommendations for how Thompson Rivers University can follow the leadership of other post-secondary institutions in adopting the tuition waiver to promote better outcomes for youth aging out of care in our community. The conclusions drawn from this research highlight how tuition waivers can create an equality of opportunity for former youth in care, allowing them to follow their career dreams and improving their quality of life.

### **The Effects of Varying Wildfire Severity on Stream Invertebrate**

Mercer, Brenden

This study looks at the Order Ephemeroptera and how different severities of wildfire can affect the aquatic ecosystem. This paper was designed to look at how different feeding or living strategies have helped certain families of Ephemeroptera demonstrate increased fitness post disturbance. In this study I looked at 4 different study sites these study sites consisted of a high severity burn site, a moderate severity burn site, a site to monitor downstream effects of the high severity burn and finally a reference condition stream. In each of the study sites Ephemeroptera were sampled using a Hess sampler then taken back to the lab to be sorted into their respective families. With the 5 different families identified and their total abundances calculated I was able to use the SPSS statistics software to run a one way ANOVA test on the normal data and a Kaskul Wallace on the non-normal data. Once the data was statistically tested it was determined that there were higher abundances of Epheremerellidae and heptageniidae in the high severity burn site when compared with the some of the other streams. Another trend was observed when the Baetidae species was shown to be much more abundant in the moderate severity burn stream than all the other sample streams. The increased success of certain families post wildfire likely depended upon their feeding ecology

and how well they were able to resist larger more unpredictable water flows and sediment movements.

### **Graph Theory: Recolouring Problems**

Moore, Ben

Graph theory is a branch of Mathematics which models discrete structures such as networks. Graphs consist of nodes together with connections between pairs of nodes called edges. For example, a social network has people as nodes and friendship as edges. Another example comes from scheduling. Nodes are events, and an edge between a pair of nodes indicates that the pair of events must be scheduled at different times. The scheduling problem can be abstracted into a general problem as follows: Given a graph, can we partition the vertices in sets so that every edge goes from one set to another different set? Such a partition is called a colouring of the graph. Formally a  $k$ -colouring is an assignment from the set of numbers (colours)  $\{1, 2, 3, \dots, k\}$  to the nodes such that two connected nodes cannot receive the same colour.

The focus of our work is recolouring. Given a  $k$ -colouring of a graph, can the colouring be modified (one node at a time) to a second colouring? This problem comes from looking at atoms which have been arranged into a lattice. The atoms are coloured according to their spin state. Recolouring then corresponds to changing an atoms spin state.

Bonsma and Cereceda showed that the recolouring problem is polynomial time solvable for  $k=2$  or 3, and is PSPACE-complete for  $k \geq 4$ . We present progress on a similar conjecture for  $(p,q)$ -colourings: the problem is polynomial for  $p/q < 4$  and PSPACE-complete for  $p/q \geq 4$ .

### **The Development of a Non-Invasive Behavioral Model of Thermal Heat Stress In Laboratory Mice (*Mus musculus*)**

Mufford, Justin

In this study a unique combination of non-invasive techniques were used to study thermoregulatory behavior of laboratory mice (*Mus musculus*). Many behavioral and physiological studies of lab mice employ invasive methods such as radio telemetry to measure key aspects of behavior and physiology. Radio telemetry requires surgical implant, which may impact mouse health and behavior, and thus reduce the reliability of the data collected. We developed a method to measure key aspects of thermoregulatory behavior without compromising animal welfare. We examined the thermoregulatory response to heat stress in mice using infrared thermography and video capture. Body surface temperature measurements and activity were simultaneously measured on mice that were heat-stressed. Heat stress was induced in two ways: raising the ambient air temperature and applying an external source of visible electromagnetic (EM) radiation. We found a difference in activity between heat-stressed and control mice. The difference in absorption of visible EM radiation between black mice and white mice did not cause a difference in surface body temperature, but did cause black mice to be less active than white mice. Due to time limitations this project was restricted to studying the change in surface body temperature and activity in response to heat stress. However, with the high resolution of data collected it is possible to measure other important physiological parameters such as energy expenditure and blood flow. This research shows the possibility of

using non-invasive techniques to study thermoregulatory behavior of mice without decreasing the usefulness of the data.

### **Becoming a "Bro": An Analysis of 21st Century Masculinity**

Neigel, Mike

In order to contribute to the growing body of research on masculinity within gender-relation studies, this research project attempts to examine the changing definition of masculinity in popular film. In particular, this study analyzes films widely known as "bro movies" that are derived from a section of the comedy-film genre. Examples of this category of films include *National Lampoons: Animal House* (1978), *American Pie* (1999), and *Pineapple Express* (2008), all of which focus on the development of male social bonds. Because these films primarily focus on a comedic representation of male homosocial connections, they offer a unique view on the construction of masculinities. However, what is presented as a facilitator of the homosocial connection in these films is often defined as deviant or even criminal: extreme alcohol use and intoxication, illicit drug use, excessive partying, property destruction, theft, sexual objectification, etc. This brings into question the role of deviance in relation to both masculine identity formation and the formation of male bonds. Through a content analysis of ten films from 1970 to 2014, this research offers an interpretation of how masculinities are constructed and performed. Thus, this paper will discuss emergent themes around masculinity and deviance and the possible consequences of these representations.

### **Higher Education Premiums in Canada**

Pelaez Jimenez, Tatiana

Duffee, Sean

In the face of increasing tuition fees, Canadian students are at a crossroad on whether they should pursue higher education. The real question is how much more a Canadian student with post-secondary education earns compared to a high school graduate and how this difference changes overtime. This paper will examine the education earnings premium for 2011-2012 and compare this result with the earnings premium for 2007-2008. Thus this research will provide more recent results. This study will utilize data obtained from the Canadian Community Health Survey, emphasizing variables such as education, age, sex, health, and marital status.

### **Researching Service Access from Adolescence to Adulthood of Individuals with Autism Spectrum Disorder**

Pierobon, Ashley

This research examines the transition period as individuals with autism spectrum disorder age out of the post-secondary school system and into adulthood and the impact that this transition has on the individuals and their families. As individuals with autism spectrum disorder transition from adolescence to adulthood, they face individual and social changes that affect services, funding, and life opportunities. This research studies the gaps in service access that are experienced by individuals with autism spectrum disorder living in Kamloops. Throughout this period of transition, it is important that services are offered that support and meet the needs of

the individuals with differing abilities. Using qualitative research methods, the experiences of individuals that are going through or have been through this transition are examined. This research seeks to uncover the ways in which this transition can foster social involvement and social inclusion or social exclusion and social isolation. It also seeks to examine how societal discourse surrounding this transition impacts individual identity formation. The research utilizes current academic literature as well as interviews with community members in Kamloops. This research will benefit the academic community as well as provide insight into the service gaps that are prevalent in Kamloops.

### **The Western Hero Myth and Women in War**

Pineau, Tyler

The paper will be concerned with the explanation of the Western Hero Myth (WHM) as laid out by Terence De Pres in *The Survivor*. This is a book that explores the concentration camps of WW2 from a philosophical perspective. One of De Pres' main goals is to break down assumptions about persons in extremity made by those from the safety of a stable society. To this end, he exposes the erroneous sacrificial nature of the WHM that contrasts starkly with reality. The argument presented by De Pres will be applied to the nature of women's roles on the "back lines" of many wars. Contrasts will be made and connections will be drawn between the front line soldiers and the women who support them, who cannot escape but must grow, learn, and live with war as a constant presence. Counter-arguments will also be addressed. Among those will be the *prima facie* reaction that front-line men are lessened by giving respect to women and by shedding light on their role in war. The idea that the argument forces women in war into a cage of traditional gender roles will also be addressed.

### **The Gospel According to the Cosmic Conscious': The Counterculture and Christianity in late 1960s North America**

Potestio, Justin

Emerging out of the post-war era and into the 1960s, much of North American society had begun to change in its religious affiliation. However, while those in the mainstream began to secularize, it was the hippie youth who were very much adopting the same faith the conventional population was leaving behind. Focusing on the period of the late 1960s, this paper will seek to establish the influence the Christian religion had upon the counterculture movement by examining the role of religion in hippie values, beliefs and lifestyle. This essay will discuss how some hippies of the counterculture movement defined themselves as Christians, which can be seen in their use of mind-altering psychedelic drugs, through which they sought to establish a connection to the divine. Following will be a look into how aspects of Christianity were included into the music of the counterculture and a discussion of the influence popular musicians, identifiable with the hippies, had on religious beliefs and spirituality. This essay will further examine the spirituality of communes and, lastly, look into what the mainstream had to say about the counterculture's "cosmic conscious." The thesis of this paper argues that by looking into the aspects of the counterculture, some hippies saw and defined themselves and their practices as more Christian than the secularizing mainstream.

### **"More Than Just a Really Big Sheew": The Beatles' *Ed Sullivan* Performance and Societal Deviance**

Potestio, Justin

The Beatles' performance on *The Ed Sullivan Show* in early February 1964 was a ground-breaking moment, deviating away from what American society valued, believed, and thought up to that time. This paper will discuss the event most people refer to as "the moment the Sixties began," examining the roles that deviance and social control played in this cultural landmark experience. First, I will consider the historical context of American society before 1964, a period known as the "Early Sixties." Then I will briefly discuss *The Ed Sullivan Show* to explain what it represented to most Americans during this time. This paper will then assess the role of the Beatles by identifying the types of "deviance" they came to represent in their debut in America. This will be done by looking at their music, the way their audience of teenage girls reacted, and especially their appearance (specifically their hair). Furthermore, this paper will analyze how these "acts" were depicted and even constructed as deviant through newspaper articles, by looking at the media coverage leading up to and after their arrival and performance. Lastly, this paper will discuss the negative representation of the Beatles' deviant image and comment on how their image in the media could have been seen as a form of social control. This paper argues while the Beatles' performance on *Ed Sullivan* may have been the beginning of the vast changes known as "The Sixties," their deviance was constructed by the media of an "older America."

### **Softwood Lumber Exports from British Columbia to the United States: an Econometric Approach**

Prince, Spencer

The lumber industry in British Columbia, which exports a large portion of its softwood lumber to the United States, has been surrounded in controversy for many years. While the United States believes that Canadian lumber has unfair subsidies on their stumpage costs, Canada has been fighting for lower, or a cessation of, export taxes placed on their goods. The reason for this research is that this is a very local issue that impacts the lives of many British Columbians. The research is based heavily on previous literature on the topic, and is built upon recommendations for further research. Interesting relationships were found between economic factors and exports, which may be useful in understanding the industry. This research is important because we will be able to see the impact of the current trade agreement, and how daily variables such as interest rate and exchange rate have impacts on the softwood lumber industry.

### **Brazil Exports, Determinants and the Great Recession**

Purdey, Chipman

The proposed research strives to observe a significant relationship between Brazilian Export Value and a number of independent variables: exchange rates, prices of exports, and GDP growth rates of trading nations. Furthermore, this study will be including dummy variables to test how these relationships change over time periods of major macroeconomic events, such as the Global Financial Crisis of 2008 and the South American Financial Crisis of 2002. The purpose of this research is to see how Brazil's exports are affected by factors both internal and external to Brazil's economy. Regarding internal issues, Brazil may be able to work to make its exports



more successful in the world economy, but assessing external variables is also important to see how Brazil's exports may react to fluctuations of variables beyond their government's control. Integrated economies take on more risk by becoming interdependent, and if an economy becomes over-invested in particular exported products, it may have serious consequences for the entire economy when prices, exchange rates, or the GDPs of trading nations become unsuitable for trade. The purpose of this study is to see how reactive the Brazil export value is to these variables.

### **Salmon Teachings**

Robinson, Jordan

This is a creative non-fiction paper written about the Adams River salmon run from the perspective of an aboriginal man. On a natural history field trip to the Adams River, I found myself wanting to not just watch, but to pick up and to eat a large sockeye male. However, the moment my hand met his scale, I was confronted with what it means to be native. In my tradition, the elders say that we need the gifts from nature. They say that treating these gifts as precious is the definition of native tradition. In the Adams River, salmon feed the environment, yet with trail mix in my bag, I no longer need the salmon for my own survival. Would taking the salmon when I didn't need it be treating the salmon as precious? As a native person away from my band, Cold Lake First Nations, it is easy to believe that I am detached from the natural world and its gifts – unnatural. Yet, as I released the salmon back into the water, I understood its gift. This salmon had a story; moreover, his story became a part of mine. Stories that tie us to the land seem to me the essence of being native. This is a part of my story about nature, fish and a love for the little things.

### **Does Bacterial Infection Cause Mortality of Juvenile Marine Invertebrates?**

Sandee, Samantha

Marine invertebrates undergo a significant amount of mortality during the juvenile phase, with many species experiencing well over 90% mortality during that time. This means that this phase is important in determining what the overall adult population size will be, and thus how many offspring are likely to be produced in following years. To predict how much juvenile mortality will occur, the factors that cause mortality in the wild need to be elucidated. While some factors such as heat, desiccation, UV radiation, and predation stress have been established as causes of mortality, it is unknown whether or not bacterial infection also causes mortality. Bacterial infection seems a likely candidate, as bacteria are known to cause mass mortality events of wild adult marine invertebrates and to cause substantial mortality of juveniles reared in the aquaculture industry. This research was carried out in Bamfield B.C. from June to August 2014, exposing juvenile *M. trossulus* (mussels) and *N. ostrina* (snails) to either antibiotics or control treatments. There was no difference in mortality between the treatment and control groups, indicating that bacteria likely cause little or no mortality of juvenile marine invertebrates in natural settings. Further, overall mortality in both the experimental and control groups was low, indicating that bacterial, viral and fungal infections do not cause a substantial amount of mortality. These findings are significant because knowing the factors that cause juvenile mortality can aid in environmental conservation, fisheries management and predicting ecosystem responses to environmental impacts.

### **Media Representations of Incarceration and Drug Use**

Scott, Kenneth

As has been extensively documented, the media play a fundamental role in influencing public perceptions of social issues. This in turn has significant implications for policy development and decision making. Since the popularization of film and at home television, themes about the criminal justice system and, more specifically, representations of prisons have been widespread. Prison is a foreign concept for most people, who will likely have very little, if any, direct contact with the institution; television fills this gap by providing easy access to these images. Through a qualitative content analysis of the first seasons of *OZ* and *Orange is the New Black*, this paper will explore emergent themes relating to the depiction of drug use and addiction in prisons. Particular emphasis will be placed on the media representation and conceptualization of treatment in prisons and how these can vary in gender specific ways. The data gathered will be used to consider the impact that these representations could have on shaping and/or influencing public perceptions and understandings of public policy. Contemporary emphasis on finding new solutions to incarcerating people with addictions and reevaluating the penitentiary system makes this research incredibly relevant.

### **Deconstructing Police-Aboriginal Colonial Relationships**

Scott, Kenneth

Aboriginal people are consistently over represented in all levels of the criminal justice system in Canada. Aboriginal people make up about three percent of Canada's total population. However, in 2012-13 they accounted for 20.5% of federal corrections admissions and 16.2% of sentences served in the community (such as conditional sentences, remand, or probation). Given these statistics, the assumption might be that Aboriginal people commit more crime than other demographics. In this presentation I suggest that such an assumption not just misses, but also reinforces, one of the fundamental factors at the core of this issue – systemic racism. Specifically, I am interested in the role that police play in maintaining the systemic racism that structures an unequal execution of justice. As the first level of the criminal justice system most people encounter, police officers play a role in perpetuating discriminatory practices that deserves special attention. Bearing in mind the significantly lower levels of satisfaction that Canadian Aboriginal peoples report in assessments of police performance, this research looks at the ways in which many Aboriginal peoples' trust of police agencies has been betrayed by the police as part of a system of assimilatory, colonial institutions with deep historical roots that inform contemporary practices and encounters. From there, attention can be paid to the need to reconcile tense and untrusting police-Aboriginal community relations, fundamental for effective police operations.

### **Victory Red: Make-Up's Impact on the American Homefront**

Seaton, Alanah

World War II was a time of tremendous change. Realities had to be altered in order to aid the war effort, but they were not easy for Americans to embrace. It had to be recognized that these

changes in aid of the war effort would only be temporary. One of the changes was that women would need to be contributing members of the war effort. This was a huge but necessary adjustment to American traditions. Through propaganda, the government conveyed its desires to have women engaged in the war effort. By using traditional guidelines that defined women, the government, with the cooperation of the media, convinced the American public that women in the war effort would keep their femininity. By emphasizing how femininity could benefit the war effort without jeopardizing the manliness of war, the government redefined ideal women in America. Female products, such as lipstick, played a major role in portraying this new women and her place in wartime America.

### **Women's Equality in the USSR**

Seifrit, Kaitlyn

In the years following the Russian Revolution, many different aspects of Russian society had to be looked at and decided upon. Policies were developed to create a new society on every level – class, politics, economy, and social norms. Among all of the different parts of Russian culture that the Soviets had to look at and make legislation on was the question of women. Women in other countries were just beginning to fight for equal rights in the first wave of feminism. In Russia, the question of what women's role would be in the new state was answered in the 1919 legislation. This role would change depending on the leader of the Communist Party as no one idea of woman's role had yet developed. The role that would be decided by Lenin, Stalin and those that followed would often differ from the reality. Men from the top down would decide on women's status in society, but this would not always translate into belief from the bottom up.

### **Effects of the Ongoing Cycle of Colonialism**

Silva, Clarice

In this presentation I will examine the over representation of Aboriginal people in the Criminal Justice System and the potential relationship between this and family violence. How is it that Aboriginal people make up 4.3% of Canada's population, yet represent the highest population in the criminal justice system? This is an important social issue for Canada and is directly relevant for my future practice as a social worker. With so many factors at play in creating the conditions whereby so many Aboriginal people find themselves entangled with the criminal justice system, what is needed is research that attempts to tease out specific issues. Accordingly, I will explore the relationship between Aboriginal people and the criminal justice system by focusing on Family Violence. This research will be set within the context of broader enduring and ongoing effects of colonialism. Exploring trauma, violence and the loss of Aboriginal identity and culture requires that attention be paid to the ongoing, intergenerational effects of colonialism. This has real implications for families, communities, and individuals.

### **Starting from the Bottom: Social Stratification and Social Mobility within an Eastern Slovak Romani Community**

Sim, Kenna

The Romani people are one of the most stigmatized and marginalized ethnic groups in Europe, particularly in eastern Slovakia, where Romani populations are segregated from the mainstream population in impoverished, overcrowded ghettos. With deplorable living conditions, unequal access to public education, and limited employment prospects, the majority of eastern Slovakia's Roma are dependent on welfare and live in dire poverty. This research project analyzes the social stratification within these Romani communities and the possibility of social mobility for their members, using the Romani community of Svinia, Slovakia, as a case study. The current literature, along with firsthand participant observation of the people of Svinia, shows that within the community there is a small, upwardly mobile local elite, a middle class, and a particularly impoverished underclass. The most lucrative way to gain wealth in the settlement is by loan-sharking and taking advantage of the "feast and famine" consumption style of their cohabitants. The conclusions drawn from the research demonstrate the survival strategies adopted by the local Romani population, as well as illustrate the complex social dynamics within the settlement.

### **Client-Side Stand-Alone NoSQL Database**

Singh, Sant Parkash

Database systems is a popular topic in Computing Science, and this research is on developing a client-side database system. The growing trend of web applications will lead to a need for software services such as file management systems and animation processing on the web browsers. One of these is the client-side database, which has not yet received serious consideration and seems to be a great opportunity. Web applications such as personal contacts management and offline games are good examples of situations where a database can play a vital role while saving and retrieving data. Further, the literary survey shows that there is a high demand for the NoSQL database system these days because, having flexible structure, it can easily handle the data. Therefore this research considers the use NoSQL technique with SQL queries, which is one of the oldest and most popular query languages in the world. It should be noted that none of the database systems currently on the market support this combination of techniques.

### **Mount Polley Represented in the Media**

Solde, Karin

In this presentation, I will analyze the media representation of a story that hit close to home in Likely, British Columbia. On August 4, 2014, a disastrous environmental event occurred — a breach of Imperial Metals' Mount Polley tailings pond sent millions of litres of hazardous toxic sludge into surrounding streams, rivers, and lakes. Paying particular attention to photos and headlines used to frame media representations, this analysis will focus on comparing the ways that this particular story is presented in mainstream and Indigenous-run media sources. The purpose of this comparative approach is to examine the ways that media serves to reinforce or disrupt settler-colonial stereotypes and to interrogate the politics of representation in media.

The differences between mainstream media, such as *The Vancouver Sun*, and Aboriginal-run news sources are quite apparent. In the coverage of this event, mainstream media focused more on the economic impact of the breach, while Aboriginal news sources focused mainly on the environmental effects. It is interesting to note this difference given the role that media plays in shaping collective “common sense” notions about people, issues, and indigenous-settler relations in Canada. I will present my research showing a distinct difference to how the media responded to the Mount Polley tailings pond disaster.

## **2-Faced: A Facebook Analysis of Social Class and Status**

Tabata, Nicola

Social status and class stratification are two of the most influential factors in any individual's life path. Consciously or not, everyone displays a countless array of signals that others use to determine what positions they hold in the complex societal hierarchies. Using Shamus Khan's ethnographic case study (*Privilege*), in conjunction with a content analysis of social media profiles, this paper compares the behaviour of upper-class teenagers in *Privilege* to the displays of class and status portrayals found in the content analysis. As the research subjects have been chosen from a variety of backgrounds, this study pays particular attention to the intersection of class with race and gender in its deconstruction of the educational system, Facebook "friendship", and the myth of meritocracy. Although the scope of this study is too small for definitive conclusions to be made, it is a useful demonstration of the many hidden forces of privilege and disadvantage that shape everyone's lives.

## **Media Representations of Sexual Assault and Restorative Justice**

Tunstall, Kyla

Public knowledge of crime and justice is largely derived from the media. It encourages acceptance of punitive justice while suggesting alternatives to be ineffective and unjust. This paper discusses dominant representations of sexual assault and restorative justice that are shown in the media. By addressing emergent themes of restorative justice and sexual assault, this research exposes the impact that media has on shaping and influencing public perceptions of these vital issues. The research analyses Canadian and US newspaper articles between 2005 and 2015 and investigates whether restorative justice may be used as a viable option when dealing with sexual assault cases, particularly sexual assault cases on university campuses. With the integration of previous literature, this paper introduces the relationship between media consumption and public understanding of institutional policy. Finally, it encourages society to question the role that media has in shaping our knowledge of critical matters in the criminal justice system.

## **The Problem of Pocahontas: Colonialism, Stereotypes, and Personal Identity in Janet Campbell Hale's *Bloodlines: Odyssey of a Native Daughter***

Vance, Nicole

As a genre, traditional autobiography has historically been an exclusive domain, most accessible to the male writer. In contrast, the memoir genre has broadened the field of life writing and has

granted a voice to members of marginalized groups. As acknowledged by various literary critics, the memoir form, which is less ego-focused, has been especially important to female writers who often express personal identity in relation to their surrounding communities. However, this link between the self and the communal can be damaging, especially in a dominant culture which perpetuates stereotypes about minorities. In this research paper, I analyze the manifestation of racial stereotypes in Janet Campbell Hale's memoir *Bloodlines: Odyssey of a Native Daughter* (1993) and explore the ways in which the author, who comes from a mixed blood family, attempts to discover a strong sense of personal identity in a culture dominated by images of the Indian Princess and her reviled, darker twin, The Squaw.

### **The “Happy City” Panel: Kamloops and Urban Ideals of Charles Montgomery**

Wilson, Brayden

Plato, Jacob

Mahar, Whitney

Ortiz, Radha

Sullivan, Jordan

Douglass, Leif

For a Local Government in Canada course, students are required to write three separate papers contrasting the ideals and analysis of Charles Montgomery's *Happy City: Transforming Our Lives through Urban Design* (2013) with their lived experience and observations on the City of Kamloops. The papers contrast Kamloops with the happy city ideals, examine the potential to adopt alternative design models, and compare the 'happy city' project with planning initiatives by the City of Kamloops. Panelists will present their assessments of Kamloops as a “happy city” with proposals for the best alternatives in advancing towards this ideal. The moderator for the panel will quickly and briefly lay out the happy city ideals of Montgomery, and the panel presentations by students will focus on their individual assessments and preferred alternatives for making the City of Kamloops a happy city.

### **Sexual and Domestic Abuse within Our Society**

Yanushevskaya, Anastasia

“Why did not you just leave him?” Society asks the victims of intimate partner violence with a bitterness. “Isn't that just asking for it?” they say. People judge female survivors of sexual abuse by their clothing and behaviour. The society uses these and many other ways to blame victims and excuse perpetrators of sex-crimes. The effect of justifying such behaviour is underrated, and there should be much greater consideration of this. Taking its sources from well-written academic books, this research analyzes the ways that people encourage sex crimes and disregard the injured. Rich with examples, it clarifies many important terms, including sexual abuse, intimate partner violence, the real rape stereotype, rape myths, and rape culture. Finally, it suggests possible solutions to prevent sexual abuse of women. The main purpose of the research is to increase the awareness of this sensitive topic. Today, sexual violence is a critical issue that affects people from different social layers, age groups, and cultures. In the end, anyone—regardless of the gender—may become an unfortunate victim of abuse or its witness.

### **The Ground under our Skis: European Settler Imagery and the Erasure of Indigenous Epistemologies at Sun Peaks**

Youwe, Katie

According to its website, Sun Peak is a place where, “guests enjoy award-winning downhill skiing, snowboarding and cross country skiing in the winter. Summer activities include hiking, golfing and downhill mountain biking. Sun Peaks ski resort's European-style village is nestled at the base of three mountains; Tod Mountain, Sundance and Mt. Morrisey.” This presentation will explore the ways that European settler imagery is deployed at Sun Peaks in its production as a year-round resort destination. It examines what this depiction potentially means for Indigenous-Settler relations in the region. By analyzing the portrayal of European settler imagery, we see how settler colonial ideals become hegemonic in the ways that mountains are perceived as exclusively a skiing landscape. The result is that any other ways of knowing and being is erased. Sun Peaks sits on highly contested terrain, and the erasure of Indigenous epistemologies from the site results in divisive social relationships between Aboriginal and settler peoples in the area. By examining how European symbolism is used at Sun Peaks to “naturalize” this space as exclusively as a skiing landscape, the hope is to uproot and critically examine the ways that colonial relationships are embedded into the very ground under our skis.

## **POSTER EXHIBIT PRESENTATION ABSTRACTS**

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### **The Impact of Recession on Students’ Labour Market Outcomes: Evidence from Canada**

Ahmed, Sabbir

This research project analyzes the impact of recession on students’ labour market outcomes. Tuition fees continue to rise across Canada. Between 1990 and 2011, Canadian students experienced an increase in tuition and ancillary fees at an average rate of 6.2%. In 2014, students in Canada paid on average \$7,026 as part of tuition and ancillary fees. Further, an estimated amount of more than \$5000 was associated with attending university away from home. Canadian students find it increasingly difficult to cover the costs of education. Obviously, one source of education financing is student loans. However, loan financing increases debt load and it is estimated that 60% of Canadian students graduate with an average debt load of \$27,000. Given the problems associated with debt, many students find it necessary to work during the summer and also during the regular academic sessions. Certainly, earnings from employment help many students to continue education. A post-secondary education is not only important for students’ earning and job potentials, but it also develops Canada’s human capital, which ultimately leads to economic growth. A potential threat to students’ employment opportunities is economic recession. A recession has negative impacts on the productive activities in the whole economy and thus it is obvious that students are also affected. However, an interesting issue is the severity of the impact of recession on students’ labour market outcomes such as labour force participation, employment rate and unemployment rate. If recession significantly impacts students’ labour market outcomes, then policy makers may need to take extra steps to help students so that they can continue their education.

### **Agent-Based Modelling and Simulation for Crowd Behaviour and Control Studies**

Alzate, Hector

Crowd control and behaviour studies are gaining importance as police departments around the world start working on ways to better train officers. For such tasks, we offer Agent Based Modelling and Simulation as a tool to test and evaluate the possible outcomes of the interactions of different kinds of artificial agents conforming crowds in urban areas. This is accomplished with a realistic human-like crowd behaviour based on Sociological studies. We use the Vancouver Riot event as a test scenario with a virtual model of the area near to the stadium.

### **Chara versus Marl: The Effect of Substrate on Benthic Invertebrate Communities in Lakes**

Bailey, Colin

During the last decade, small lakes biologists have observed the simultaneous decline of aquatic insect populations and Chara (calcareous algae similar in appearance to land plants) weed beds in interior BC marl lakes. These lakes provide valuable recreational fisheries, and benthic invertebrates form the basis of the rainbow trout (*Oncorhynchus mykiss*) diet. Thus, we need to understand the difference between marl (precipitated CaCO<sub>3</sub>) substrate and Chara beds, and distinguish between the effects of trout presence from substrate type with respect to benthic invertebrate populations. Our hypotheses are: 1) Chara beds support different taxa and higher invertebrate abundance than marl; 2) Fishless lakes support different taxa and greater invertebrate abundance than stocked lakes. We sampled 10 small marl lakes surrounding Kamloops: 6 lakes stocked with rainbow trout only, and 4 fishless lakes. Six Marl and 6 Chara samples were collected randomly along paired transects with a petite Ponar grab sampler in each lake.

Our results indicate that Chara beds do support different taxa than marl. Chara beds support significantly higher abundances of chironomids and damselflies than marl substrates. Additionally, dragonflies have remained entirely absent from marl samples. Significant differences between marl and Chara amphipod densities have been detected; however, amphipods preferred marl in one lake and Chara in another, and both lakes have rainbow trout. No significant effects of trout presence were detected, and the data suggest that stocking may even increase chironomid and damselfly density. Overall, Chara beds appear to be an important source of benthic invertebrates consumed by trout.

### **Egg Colouration in Mountain Bluebirds (*Sialia currucoides*): A Sexually Selected Indicator of Female Quality?**

Bailey, Jacob

The evolution of conspicuous bright blue colouration of some avian eggs is counter intuitive as it should lead to increased predation and be lost through natural selection. However, this colouration may be maintained through sexual selection as an honest indicator of female quality. Blue pigmentation in avian eggs is generally produced through the deposition of the pigment biliverdin in the eggshell. Because biliverdin is also an antioxidant, blue colouration produced through biliverdin deposition in eggshells may be a sexually selected signal to the male of the laying female's antioxidant capacity. Males may thus use egg colour as a way to



assess the laying female's quality through egg colour intensity and adjust their level of parental investment correspondingly, investing more in offspring of high quality mates. We used digital photography to measure the blue colouration of mountain bluebird eggs and quantified parental investment to investigate whether male birds adjusted their parental investment during the nestling period in response to variations in egg colour intensity. Our results suggest no relationship between average clutch egg blue colouration and parental investment. However, female parental investment is positively correlated with increased egg colour variation within clutches. These findings suggest that egg colour variation within a clutch, rather than average egg colouration, may be an important signal of individual quality.

### **Effects of Red Lake Earth on Cattle Rumen Methanogenesis**

Belanger, Corrie

Farming ruminants contributes to over 25% of anthropogenic methane (CH<sub>4</sub>), a compound which is 25 times stronger at heat trapping than CO<sub>2</sub>, making it the most impactful of greenhouse gases. Because of this, mitigation of CH<sub>4</sub> emissions is critical both environmentally and agriculturally. In this study, the effects of feed additive, Red Lake Earth (RLE), on cattle rumen fluid methane production was observed in vitro. Pure diatomaceous earth, pure calcium bentonite, and mined RLE containing a mixture of these two materials, were tested for their effects on CH<sub>4</sub> production in vitro at concentrations from 2.0 to 100 g/L. After 24 hours of incubation, CH<sub>4</sub> production was measured directly from culture headspace using gas chromatography. RLE treatments were found to reduce CH<sub>4</sub> production by up to 93% compared to untreated cultures, and the 2.0 g/L treatment was selected for 5 day time course studies using rumen fluid from 4 independent animals. Methane production in RLE treated, 5 day cultures was, on average, inhibited by 59% compared to untreated controls. Liquid culture samples were analyzed using quantitative real time PCR (qPCR; 18S and 16S rDNA) and reverse transcriptase qPCR (mcrA) to quantify the effects of RLE on numbers of protozoa, bacteria and archaea in cultures. Volatile fatty acid (VFA) and fatty acid (FA) analysis is being used to evaluate feed efficiency profiles. This research strongly supports the ability of RLE to reduce rumen CH<sub>4</sub> production in vitro by reducing methanogen activity. Ongoing research is using sequencing-based methods to characterize specific changes in microbial communities upon exposure to RLE.

### **Assembly and Annotation of *Gordonia* sp. NB4-1Y Genome Version 2.0**

Bergstrand, Lee

McInnes, Matt

*Gordonia* sp. strain NB4-1Y has been shown to be a degrader of polyfluorinated organosulfur compounds (PFCs), in particular 6:2 fluorotelomer sulfonate (6:2 FTS). 6:2 FTS and similar compounds are used as surfactants, fire-fighting foams and lubricants, and have been found to have toxic effects. PFCs degrade slowly and bioaccumulate in the environment, so discovering the process by which NB4-1Y degrades 6:2 FTS is of interest. In 2013, a draft genome sequence for NB4-1Y was published and is being used in combination with transcriptomic and proteomic studies to characterize the 6:2 FTS degradation pathway. However, this draft genome is not of sufficient quality to identify pathway genes as it is made up of more than 2300 contiguous sequences (contigs) with an average of 2.5 genes per contig. Recently, a 400 base pair whole genome shotgun was generated using the IonTorrent sequencer at TRU that has been

assembled into 173 contigs. The goal of our directed studies is to create a second generation draft genome with improved quality by testing a variety of genome assemblers that allow us to combine the new sequencing data with the 200 bp data used to produce the first version of the genome. We will also evaluate commercial cloud computing infrastructure to determine if it should be used for current and future genome assemblies. This new draft genome will also be uploaded to the National Center for Biotechnology Information's Genbank so it can be used by other scientists.

### **BioMagick: A Next Generation Bioinformatics File Format Converter**

Bergstrand, Lee

McInnes, Matt

With the democratization of next generation sequencing (NGS) technologies over the past decade, the cost of genome sequencing has dropped drastically making sequencing an ever increasingly attractive analytical method for biologists and medical professionals everywhere. To counteract this new torrent of biological data, bioinformaticians have begun to develop bioinformatic pipelines which are designed to automate the processing, filtering and analyzing of genomic sequencing data. Pipelines often consist of several bioinformatics tools in series, with the output from one bioinformatic tool being passed along to another tool. Each step in the pipeline transforms the sequence data into a more useful form. Commonly, pipeline tools are developed independently and create output files incompatible with other tools in the system. As a result, custom "glue" code has to be developed in order to transform the output file format from one tool into an input file format compatible with another. BioMagick, the software we are developing in our computing science directed studies course, is a bioinformatics file format converter designed to replace a pipeline's custom "glue" code with an easy to use command line program allowing bioinformaticians to experiment with and build new bioinformatic pipelines faster. Our tool will be able to auto-recognize text and binary Bioinformatics file formats and convert these formats to other formats autonomously. An automated testing regimen will be created to validate BioMagick. BioMagick will be open sourced and released under an MIT Licence.

### **Computer Vision for Autonomous Navigation**

Bo, Han

Buckley, Alex

Computer vision is a field that acquires, processes, analyzes, and understands images from the real world and generate numerical and symbolic information from the images. Applications of computer vision have been used for autonomous vehicles and robots, face recognition, optical character recognition, and remote sensing. The proposed research explores possibilities of using computer vision for the autonomous navigation of Miniature Aerial Vehicles (MAVs) using OpenCV (Open Source Computer Vision), a library of programming functions for real-time computer vision. This research examines colour/object detection and analyses of stream video, and applies them to autonomous navigation with a physical demonstration using an AR Drone. The outcome of this research can be used for rescue missions and/or surveillance for public safety using MAVs.

### **Ecological Influences of Extra-Pair Paternity Rates in *Paridae*: A Meta-Analysis**

Bonderud, Erica

Extra-pair paternity is a mating strategy seen in nearly 90% of all socially monogamous songbird species. Under this strategy, a female will seek extra-pair copulations with a male other than her own social mate. Females may do so to ensure fertilization success of her eggs, increase offspring genetic diversity, genetic compatibility, or increase her likelihood of producing high quality offspring. Studies to date have revealed an incredible diversity in rates of extra-pair paternity – from no extra-pair paternity to extra-pair young in nearly every nest. However, the factors that influence this variation in extra-pair paternity remain poorly understood. In the family *Paridae*, which includes chickadees, tits and titmice, extra-pair paternity is common and many studies have reported highly variable rates of extra-pair paternity both within and across species. The purpose of this research was to examine variation in *Paridae* extra-pair paternity rates in relation to ecological factors such as habitat type, geographic location and population density. To do this, I performed a meta-analysis of the recent literature, examining every published paper that has reported extra-pair paternity rates in *Paridae*.

### **Alpine Ambiguity: Reconceptualizing Skiing's Place in British Columbia**

Braidwood, Jessica

Mountains inspire numerous groups of people to develop senses of place in themselves, and one of the ways that many do so is through skiing. The result, in British Columbia, is the establishment of several destination ski resorts on unceded First Nations territory. The dominant structures and discourses that flow throughout these ski resorts and the mainstream media assumes affluent settler-skier tourists and their way of knowing as the only legitimate way to occupy and manage these mountainous areas. This works as a powerful force of exclusion and oppression, covering First Nations unceded territory up with lodges, gondolas, tourists, and ski area boundaries. In this presentation, I will examine how these discourses work through a case study of indigenous-settler relations in the mountains of the Skwelkwel'welt—an unceded territory inalienable from Secwepemc people's identity, yet illegally paved over by Sun Peaks Resort Corporation in the making of a ski resort.

Unpacking ski resorts as structures that reconstitute power relations affords us the opportunity to identify gaps that exist within a colonial framework—the failures of a neoliberal, capitalist, colonial structured ski resort to attend to the multiplicity of ways of knowing and being in mountain places. Through this analysis, we can understand these mountains as more than benign, pristine wilderness open for tourists to recreate, but as layered places where a complex political ecology lives. From there we can work towards nurturing Native-settler relations that move past oppositional and create mutually respectful relations in these mountains.

### **Believing Is Doing? Weighing the Costs and Benefits in Responding to Emotionally Evocative Situations**

Briner, E. L.

People can choose from many different strategies to regulate their emotions. Some strategies have more positive outcomes for well-being than others. However, few studies examine why

people choose one strategy over another in a given situation. Furthermore, little is known about beliefs concerning the costs and benefits of different strategies to health and well-being, and whether these beliefs play a role in the selection and implementation of particular strategies.

One hundred and seventeen undergraduates completed a questionnaire examining individual preferences for emotion regulation strategies in nine emotionally evocative scenarios. They rated how intense and pleasant their feelings were in each situation. Finally, they rated the extent to which they believed each strategy to be effortful, to reduce negative feelings, physical changes, and facial expressions of emotion, and to increase overall well-being. Participants also reported on their happiness, life satisfaction, perceived stress, and psychological well-being.

I am using quantitative statistical methods (including regression), to analyze the data. The findings will show the extent to which beliefs about the consequences of emotion regulation strategies (i.e., strategies for reducing negative feelings and having positive health outcomes) predict preferences for different emotion regulation strategies and well-being. The study will therefore add to our understanding of the variables that guide people's emotion regulation choices. Future research building on the findings could be directed towards facilitating adaptive emotion regulation choices.

### **Liquid Chromatography-Mass Spectrometry Analysis of Potentially-Significant Benzophenones in Swimming Pool and River Waters**

Brooks, Madeline

Benzophenones are a class of compounds that are commonly used as UV filter molecules in sunscreen and other skin care formulations. They have become a growing concern as a pollutant, as they are released into water bodies as they are washed off the skin of people swimming. This project focuses on the detection of several benzophenones in samples from swimming pools and river water by liquid chromatography-mass spectrometry (LC/MS). Pure standards of each benzophenone dissolved in ethanol were prepared and analyzed to obtain a calibration curve. Samples were analyzed using the developed method and the concentrations of the various benzophenones were determined using the appropriate calibration curve.

### **The Cuban Experience: A 2013 Field School and a Model for Global Competency**

Calviello, Eleonora

In 2013, I had the opportunity of attending a Social Work course which entailed travelling to Cuba for two weeks to observe various aspects of Cuban life, culture and societal structure. We were welcomed to hospitals, schools, retirement homes and met with experts in all sorts of social settings. The intercultural experience was absolutely invaluable for my personal growth. Cuba has become a hot topic today, since the United States has finally begun to open relations again. However, what does this mean in terms of intercultural interaction? My poster will explore the reality of Cuba not from a political perspective, but from the cultural model of a communalist society. I will include the experience I have gained from the 2013 Field School, especially in regard to the Cuban education system, as well as notions of cultural models I have acquired from my Intercultural Communication class. These models include Satoshi Ishii's Model

of Culture and Professor Geert Hofstede's model of cultural dimension to explore what the implication is of a cultural interaction between an individualistic society and a communalist one.

### **Determination of Triclosan in Personal Care Products and Swimming Pool Samples by Liquid Chromatography-Mass Spectrometry**

Chattu, Devin

A sensitive, rapid LC/MS method was developed to detect triclosan in personal care products such as toothpaste, liquid soaps, facial cleanser, and cut cleaner, as well as public swimming pool water samples using a C-18 column. Triclosan is a widely used antibacterial agent, and its effects on human health are controversial. It is a known endocrine disrupter, however; not enough information is known about its potential hazardous effects on human health to justify a boycott of all triclosan containing products. It should be noted that industries are pushing towards avoiding the use of this chemical. As an active bactericide, very minute quantities of triclosan can pose a severe risk to marine life in aquatic ecosystems as well. The detection of triclosan in personal care products and swimming pool water samples will hopefully urge consumers to reduce or avoid the use of triclosan containing products. In this research, experimental conditions such as column temperature, solvents, flow rate, solid phase extraction, and experimental procedure, were all optimized to find the best experimental conditions for determining triclosan in the samples. Using the optimized conditions, several personal care products and swimming pool samples would be analyzed to find out the levels present in them and compare the resulting values to the manufacturers' claims, as well as the maximum allowable concentrations for triclosan in these samples.

### **Analysis of Triglycerides in Cooking Oils Using MALDI-TOF Mass Spectrometry and Principal Component Analysis**

Cooley, Kevin

Triglycerides are composed of three esterified fatty acids bound to a glycerol backbone, and are the main component of several types of cooking oils. They are biologically important molecules in that they serve as an important source of energy. The analysis of lipids using other forms of mass spectrometry has proved difficult due to the large degree of fragmentation observed in the ionization process, thus stressing the importance of the development of a new method. In this study the analysis of these triglycerides in nine common cooking oils was conducted using matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry. Using 2,5-dihydroxybenzoic acid (DHB) as a matrix, intact triglycerides were successfully identified in all nine cooking oils with little fragmentation. Principal component analysis (PCA), a chemometric technique used to identify underlying similarities and differences in a set of data, was used in conjunction with MALDI-TOF mass spectrometry. The application of PCA to the mass spectral data obtained from the MALDI-TOF mass spectrometer allowed for further comparison of the underlying properties and components of each cooking oil. It is expected that if the results from PCA show noticeable differences in particular oils, the MALDI method will also be able to discriminate between these differences. If successful this MALDI method can then be used to identify unknown oil samples or provide quality control in commercial settings.

## **The Effect of Personality Traits and Physical Attractiveness on Dating Preferences in an Online Setting**

Corno, Daniela

Advances in technology have led to changes in dating protocol, with more people moving towards online dating as a way of finding a mate. With this platform shift comes possible changes in strategies used when deciding on a potential partner. Although there are many factors one might consider in a mate, psychologists have delineated four potential characteristics of interest. This study tests the relative impact on dating preferences that each of these three characteristics might have: gene indicators (looks, intelligence), resource acquisition potential indicators (education and potential earnings), and partner indicators (being loyal and committed).

Undergraduate students will view a series of online dating profiles and for each will rate their interest in regards to both a long-term and short-term relationship. Four binary factors will be examined: attractiveness, intelligence, socioeconomic status, and partner indicators. Based on previous work, we anticipate that females will show higher preference for intelligence and attractiveness when considering a short-term relationship, but higher preference for good partner indicators and resource acquisition potential when considering a long-term relationship. Our study will also ask males to complete the study, but ask them to report what they feel a straight female's preferences would be. In doing so, we will assess the relative impact, both individually, and in conjunction with one another, that these factors might have on dating preferences in an online setting.

## **Determination of Triclosan in Personal Care Products by Capillary Electrophoresis**

Drayton, Matthew

Triclosan is an antibacterial agent found in a wide variety of products, most commonly in cosmetics and personal care products. Ninety-five percent of these products are washed down the drain and collect in receiving waters, where they bioaccumulate as dioxins, molecules that are highly toxic to organisms like fish and birds. The widespread use of triclosan has also been implicated to cause bacterial resistance and to affect the endocrine system of humans; consequently, the utilization of triclosan has been called under question by a number of environmental groups. This experimental work was undertaken to develop a method by which triclosan found in personal care products could be easily and accurately quantified via capillary electrophoresis (CE). CE is a fast, efficient and low-cost alternative to other analytical techniques previously used for the quantification of triclosan, such as liquid chromatography and gas chromatography. The utilization of this CE method could be beneficial in monitoring the use of triclosan in personal care products in the future.

### **An Analysis of Stomatal Density in the Fruit of Lodgepole Pine Dwarf Mistletoe Using Scanning Electron Microscopy**

Dulay, Sunny

Ledoux, Kaleb

Newton, Jennifer

Lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) is a parasite found on commercially valuable timber species in the British Columbia Interior. *Arceuthobium americanum* is considered a hemiparasite; it grows into xylem cells to access the host's transpiration system. Transpiration is loss of water through the dermal layer of plants. Stomata ("plant pores") govern water loss in many plants, since open stomata lead to transpirational water loss. Transpiration rates are high in *A. americanum*, even when exposed to water stress, since the parasite does not rely on its own uptake of water from the ground. However, no study to date has actually examined the stomata or their density in *A. americanum* over development. The objective of this study is to use scanning electron microscopy (SEM) to investigate the density and location of stomata on *A. americanum* fruits during their maturation. Preserved fruit that had been collected weekly from March to September (2008) were observed with the SEM, and, using image analysis software, the approximate area and density of stomata were calculated. The stomata seem to be located on about one third of the fruit on the apical end, and their orientation appears to be transverse. Stomatal density analyses are currently underway, but it is hypothesized that as the fruit develops, fewer stomata will develop, preserving metabolic costs for the expanding fruit. As stomata are essential for overall plant health, this research may have implications for the lumber industry, as blocking transpiration losses through *A. americanum* may be a mechanism for forest management.

### **Synthesis of a Biomimetic Copper Water Oxidation Catalyst and 1H NMR Characterization: A Multidisciplinary Undergraduate Laboratory Experiment**

Endean, Riley

This undergraduate research project is focused on the creation of a laboratory experiment that crosses the fields of green, biomimetic, inorganic, organic, and organometallic chemistry. Greener sources of energy production are in high demand due to negative global impacts from producing energy through the combustion of fossil fuels. The production of hydrogen-fuel through water splitting is one environmentally friendly energy alternative. In nature an inorganic oxygen evolution catalyst (OEC), present within photosystem II, can split water into hydrogen and oxygen molecules. Water oxidation catalysts (WOCs) are of great interest due to their ability to mimic this naturally occurring process. Research involved investigation of the synthesis and NMR characterization of a series of WOC suitable for providing a rich learning experience for students. A goal of this project was to consider the implementation of a greener student laboratory where learning outcomes across multiple years of undergraduate laboratories could be proposed. The experimental progress and results to date will be presented.

## **Splicing Overlap Extension PCR for the Synthesis of the *Drosophila melanogaster* Target of Rapamycin Gene**

Esslinger, Eric

Constructing large DNA molecules in a specific fashion is essential for studies that aim to reprogram living organisms through genetic engineering, or for projects that manipulate model organisms for the production of proteins, either for industrial use or study. Splicing overlap extension PCR (SOE PCR) is a currently existing method that sees relatively little use, yet constructs DNA sequence in a rapid, economical, and adaptable manner. In this method, a single contiguous sequence is constructed by joining two or several discontinuous DNA sequences together through PCR. The sequences to be joined are amplified using primers containing 5' overhangs, which create overlapping regions that serve as a junction between two neighbouring sequences. PCR extends the overlap to yield full-length double stranded sequences. A novel advantage of this technique is that by removing introns it is possible to express the eukaryotic gene in a prokaryote for further study. Here, this method was used to generate sequence for the *Drosophila melanogaster* Target of Rapamycin (TOR) protein, a central regulatory protein for the cell. Seven exon sequences were joined so that the gene could be expressed in *Escherichia coli*, and the protein could be produced for study. A general procedure was developed that could be adapted to construct sequence for a wide variety of projects and SOE PCR will likely be used in future projects at Thompson Rivers University.

## **The Use of EthoVision Software as a Novel Method for Aiding in the Automated Processing of Behavioural Videos in Wild Mountain Bluebirds (*Sialia currucoides*)**

Evans, Dean

McArthur, Sarah

Offspring provisioning is a vital and extensively studied component of animal parental care. However, studying offspring provisioning can be a time consuming task involving many hours of in field observation or manual video analysis. The purpose of this project was to develop an effective method for using EthoVision video tracking software to help automate the analysis of behavioural videos of wild mountain bluebirds (*Sialia currucoides*). EthoVision is commonly used to track movements of small animals in controlled settings (e.g., movements of mice in cages) but has never been used to study the behaviour of wild, free-living animals. First, I determined the optimal settings and procedures for producing the best results when using nest watch videos within the EthoVision software. Next, using Ethovision, I obtained time stamps indicating activity near each nest box, allowing for rapid determination of provisioning trips by either male or female birds to their offspring. The effectiveness of this technique was examined through comparing EthoVision provisioning results to manual analysis to determine the incidence of false positive and negative rates. Finally, I compared the time required to analyze nest watch videos using EthoVision versus manual analysis. Our results indicate that EthoVision results are highly comparable to manual analysis, but save a significant amount of time, suggesting that this is a viable technique for field researchers studying nestling provisioning in the wild.



### **Are Dominance Hierarchies in Mountain Chickadees (*Poecile gambeli*) Associated with Individual Condition, Body Size, or Age?**

Eye, Dana

Dominance status within a flock can have many implications for an individual such as mediating access to food resources, survival, and reproductive success. Linear dominance hierarchies have been documented in black-capped chickadees in both laboratory and field experiments, however it remains unknown if stable dominance hierarchies exist in mountain chickadee flocks. Furthermore, it is unclear whether condition, size or age of mountain chickadees determines their status within the hierarchy. My objective was to compare these three factors in pair wise interactions of dominant and subordinate chickadees to see if they are related to individual dominance status. I predict that dominant individuals will be older, larger, and have a higher mass to tarsus ratio. Mountain chickadees were caught in potter traps at feeding stations in Kenna Cartwright Park as well as several locations at Thompson Rivers University. Upon capture, each individual was banded, weighed, aged (by appearance of feathers), and we recorded tarsus length, wing length, and tail feather lengths. Pair-wise interactions will be observed at these locations from February-March 2015 to examine dominance relationships. Upon the establishment of the hierarchy, condition (tarsus versus mass ratio), size, and age will be compared between dominant and subordinate individuals. Based on the results of this study I hope to have a better understanding on the dominance hierarchy among mountain chickadees, as well as the effects that morphology, age and condition can have on social rank.

### ***The Womanish-Man and The Man-Woman: Cross-Dressing in Early Modern England***

Fenhuber, Megan

The focus of this paper was on two pamphlets written in 1620 entitled *Hic Mulier or The Man-Woman* and *Hæc-Vir or The Womanish-Man*. The first is in the voice of a man denouncing female cross-dressers, and the second is in the voice of woman defending her choices. The idea that the clothing you wore made your gender and role in society, as well as the belief that the mother passed down her traits to the child through nursing was what made these cross-dressers so offensive. Punishments varied across Europe even though it was not illegal to cross-dress. In England, it was automatically assumed the women were prostitutes. It has been argued that the events outlined in the pamphlets were caused by female members from an early form of middle-class protesting these ideas. There is also evidence of women cross-dressing for a variety of other reasons. As for the men who crossed-dressed, most of them did it in a professional capacity as actors on the stage. This was romanticized, and it has been theorized that it allowed men to experience homosexual desires in a safe environment without overtly acting on them.

### **How Parental Beliefs about Behaviour, Social Norms, and Control Predict Children's Engagement with Nature**

Hodgson, Lisa

In this research project I utilized the theory of planned behavior to investigate the role of parents' attitudes and intentions surrounding their children engaging with nature. Recent attention, in both media and academic spheres, has focused on the important role that engaging with nature may have on our well-being. In order to examine the factors that influence parents'

decisions to have their children participate in nature-based activities, Kamloops parents, with children between the ages of 2 and 15, were surveyed. Parents completed questions regarding parental attitudes towards nature, perceived social norms, and behavioral control, as well as specific perceived benefits and barriers towards spending time in nature. Specific perceived benefits and barriers were strong predictors of parents' intentions and a model including the theory of planned behavior and additional constructs accounted for 35% of the variance in children's time spent in nature. A better understanding of the factors that influence parents' decisions to have their children spend time in nature has important implications for promoting children's engagement with nature through policy making and educational endeavors.

### **Development of a Serious Virtual Reality Videogame to Aid in ACL-Injured Patients' Rehabilitation Program**

Jin, Hao

Anterior cruciate ligament (ACL) injuries are very common during sports such as soccer, skiing and American football. ACL-injured patients always need a proper physical rehabilitation program to enhance mobility and strengthening muscles related to knee support. This rehabilitation program is of paramount importance for ACL-injured patients to consistently follow in order to get back to their pristine knee fitness. Since the uses of VR videogames to improve health outcomes are a burgeoning area of rehabilitation research, I developed a serious virtual reality (VR) interactive video game for the purpose of helping ACL-injured patients stick to their physical rehabilitation routine, and helping ACL physical therapists monitor and assess their patients' rehabilitation progress. This game was developed using Unity3D, and a Kinect was used to track body movement. I plan to hire a few students to do the usability test, and hope to find out the usability, playability, and effectiveness of this game.

### **The Influence of Host Quality on *Coleophora deauratella* Larval Abundance and Growth on Red and Alsike Clover**

Jorgensen, Amanda

The red clover casebearer moth (RCCB), *Coleophora deauratella* (*Lepidoptera: Coleophoridae*), is an invasive red clover pest introduced to Canada in the 1960's. The larvae feed on developing seed from June to late August, then overwinter in crop debris. RCCB can cause seed yield losses of  $\geq 80\%$  in second-year seed stands of red clover. There are no registered pesticides for RCCB. Both larvae and adults have been reported in alsike clover fields but little damage is seen on these plants, and female moths display lower fecundity on alsike clover. Larval abundance in red and alsike clover seed crop fields and volunteer clover patches were compared. Host quality was determined by rearing field-collected larvae on laboratory-grown clover flowerheads and observing growth and development. No larvae were recovered from alsike clover fields or volunteer alsike patches, while 338 larvae were recovered from red clover fields and volunteer patches. Larvae reared on red clover for one month gained more weight overall than larvae reared on alsike clover. This suggests that the difference in damage and fecundity may be due to lower host quality.

## **Moult Strategies in Western North American Passerines: Molt Migration**

Kusack, Jackson

Moulting of feathers is a process with high energetic costs. Many strategies exist to adjust the timing of moult in order to better suit the environment. Most of these strategies are well documented, but one strategy has only recently gained interest in the scientific eye: moult migration. Moult migration is a strategy that is only known to occur in 7 North American passerine birds. This strategy is characterized by moult occurring at a stopover point during migration. This stopover point is identical for all known moult migrants and it occurs in the Mexican monsoon region. This unique strategy is perplexing because it seems to be independent of phylogeny, due to the fact it occurs in 5 families but only 7 species are known to exhibit the behaviour (*Tyrannidae*, *Vireonidae*, *Fringillidae*, *Cardinalidae*, and *Icteridae*). Our objective was to compare life history traits of known moult migratory passerines to other North American migratory passerines. Data was collected from online data bases (The Birds of North America), and from publications, on 60 North American migratory passerine birds. In order to compare the different strategies, we compiled data for plumage colour score, average clutch size, predominant number of broods, breeding system, proportion of nest with EPP, social system, nest type, breeding habitat, foraging behavior, diet breadth, and conservation status. Using multivariate analyses, we plan to find relationship between the known moult migratory birds, and their life history traits.

## **Investigation of Matrix Assisted Laser Desorption/Ionisation Time-of-Flight Mass Spectrometry (MALDI-TOF-MS) for Detection of *Clostridium difficile* Toxin A and B from Stool Samples**

Lam, Cindy

This study investigates the use of MALDI to detect *C. difficile* toxins A and B from stool samples. *C. difficile* toxin positive stool samples sent to Royal Inland Hospital were diluted 10-fold in deionized water or phosphate buffered saline (PBS) and vortexed to create a relatively homogeneous suspension. Samples were then centrifuged and the pellet removed. Proteins in the supernatant were precipitated with acetonitrile or ammonium sulfate and the solution was centrifuged again. The pellet was resuspended in deionized water or TA30 and spotted on a MALDI plate with a sinnapinic acid or SDHB matrix co-crystalized.

MALDI analysis showed no difference between samples diluted in deionized water and those diluted in PBS. Protein precipitation with acetonitrile produced higher quality spectra than protein precipitation with ammonium sulfate. Sample co-crystalization with sinnapinic acid provided higher quality spectra than SDHB. MALDI analysis showed a peak at 56 kDa in four samples. No peaks were seen in the 63 kDa range in any of the samples. Autocleavage of a commercially known toxin A also failed to show the expected peak at 63 kDa.

We were unable to use MALDI to detect *C. difficile* toxin A and B from crude stool protein extracts. Further studies would be required to ascertain the possibility of using this technological tool to detect *C. difficile* toxin as an alternative method of diagnosis to the tests currently available. Although inconclusive, this study is a starting point for the use of MALDI as a diagnostic tool in a clinical setting.

### **Genome Surgery: Editing DNA using the CRISPR-Cas system**

Lane, Jillian

Humans have been manipulating the characteristics of plants and animals for thousands of years through selective breeding. Then, within a lifetime, knowledge of the mechanisms of DNA increased so considerably that researchers are now able to make small, targeted changes directly to an organism's genome. This process is called genetic engineering and its transformative power is vast; it is considered an invaluable tool for studying gene functions, genetic disorders, development and disease therapy. In 2012 a new method known as the CRISPR-Cas system was discovered which granted unprecedented precision and control over the process and thus rapidly became a popular method of manipulating DNA. This project brought the CRISPR-Cas system to Thompson Rivers University for the first time and applied it in the soil bacterium *Gordonia*, to characterize the microbial metabolism of a per-fluorinated compound, 6:2 FTS. To accomplish this, CRISPR sequences were designed to target a region of the *Gordonia* genome coding for two proteins, ISGA 1222 and 1218, hypothesized to catalyze the initial step of the 6:2 FTS degradation pathway. These sequences are incorporated into a plasmid containing CRISPR machinery for transformation and expression in *Gordonia*, creating a knock-out mutant devoid of ISGA 1222 and 1218. This will allow us to study the behavior of the organism in the absence of these proteins and convey information about the proteins' functions. This work establishes a precedent for using the CRISPR-Cas system at Thompson Rivers University and will lead to future work establishing the mechanism of 6:2 FTS metabolism.

### **Culture Loss: Traditional Taiwanese Tea**

Lee, Chia Yi

Tea has been the major beverage in traditional Taiwanese culture. However, the coffee industry has been expanding from the Western world to the East, and coffee-drinking culture has been introduced to many Asian countries, including Taiwan. Because many Taiwanese people are now drinking more coffee than tea, the traditional tea culture is gradually disappearing. This research project identifies and analyzes the issues surrounding the loss of traditional Taiwanese tea culture and gathers marketing data in order to consider different possible solutions to the problem. Building cooperation between traditional tea merchants and local coffee shops in Taiwan is one way of supporting tea culture. Tea merchants could sell tea to the coffee shops, and the coffee shops could develop a new menu which includes not only coffee, but also traditional Taiwanese tea.

### **The Voice of Transgender Sex Workers in Relation to their Experiences in Health Care**

LePage, Rachel

Roche, Kirsten

The purpose of this research project is to document the personal experiences of transgender sex workers (TSWs) in dealing with the healthcare system. Healthcare professionals (HCP) exposure to sex workers or transgender people is limited, and often when exposed to this population HCP do not know the proper way to behave. This can lead to TSWs not feeling safe to access healthcare, which can have adverse health outcomes on TSWs. Grounded in phenomenology

and thematic analysis, phase one of this research involved collecting data through interviews with TSWs to explore the positive and negative experiences TSWs have had in regards to their involvement in healthcare. During phase two of the research, a thematic analysis will be conducted focusing on a series of themes that were identified through interviews with TSWs, and any gaps or barriers to TSWs care will be explored. The conclusions drawn from the research will lay the foundation for recommendations and suggestions to be made on how HCP can help to provide a safe, supportive health care environment for TSWs. This will foster a better understanding of this unique population, and assist in equipping HCP with the knowledge they need to provide competent care.

### **Feeding Ecology of Rainbow Trout in White Lake, B.C.**

Marchant, Ross

Seasonal variations in feeding patterns of a population of Rainbow Trout throughout May to November were observed in White Lake, B.C. The purpose of discovering these feeding patterns is to determine the overall health and well-being of the trout population in the lake. Aquatic invertebrate species composition and biomass in the littoral zone of White Lake was examined to determine prey availability. In order to assess feeding patterns, trout were collected from local anglers from May through November 2014. The diets were examined by opening up the stomachs and counting items to determine prey composition, biomass and caloric intake throughout the year. This method will give an indication of feeding patterns and prey preferences. Zooplankton (water fleas) were the most common prey item and were found in 85% of trout stomachs throughout the observation period. Non-biting midge pupae (family Chironomidae) were also prevalent in May samples; however, they decreased throughout the year and were seen in only one fish's diet in November. Overall non-biting midges were found in 54% of trout stomachs throughout the year. Order Amphipoda (scuds) also made up a significant portion of trout diets in November but were rarely seen in May through September. Amphipods were found in 22% of stomachs sampled. Prey, including dragonflies (22%), damselflies (13%), snails (13%) and mayflies (7%), were also found in stomachs throughout the year.

### **What is on Your Plate? Health Attributes of Meat, Poultry, and Fish Fatty Acids**

Martins, Lucas

Meat, poultry and fish are recognized as excellent sources of protein, but also provide our diet with omega-6 (n-6) and omega-3 (n-3) essential fatty acids (FA) (i.e. 18:2n-6, 18:3n-3) and their more biofunctional long-chain (LC) derivatives (i.e. 20:4n-6, 20:5n-3, 22:5n-3, 22:6n-3). Industrialized agriculture has contributed to abundant use of vegetable oils in processed foods, greatly increasing our intake of 18:2n-6. Similarly, intensive livestock production systems have altered the FA profile, specifically the proportions of omega-6 (n-6), and omega-3 (n-3), of the products. Increased incidences of metabolic disorders/inflammatory response are thought to be influenced by LC-FA intake and high dietary n-6/n-3 ratio. In this study, the polar and neutral lipid FA profiles of muscle tissues were compared by feeding system within monogastric, ruminant and fish. Neutral FA were rich in SFA, c-MUFA and in the case of ruminants, t-MUFA, whereas PUFA were more abundant in membrane-bound polar lipids. Intensive production systems tend to decrease the proportion of desirable FA, raising the n-6/n-3 ratio. Fish are an excellent source in desirable LC-n-3 FA, largely related to being poikilotherms and diets rich in

phytoplankton derived FA. Monogastrics had a high proportion of PUFA, however, this was mostly 18:2n-6, leading to an elevated n-6/n-3 ratio reflected the prominence of grain and vegetable oils in their diets. Grain-fed ruminant profiles were more similar to monogastrics, whereas, grass-fed ruminants had higher proportions of desirable n-3 FA. In conclusion, grass-fed ruminants have a desirable n-6/n-3 ratio below 4:1 and are the best alternative to fish to increase LC-n-3 intake. Increasing daily PUFA intake, emphasizing n-3 FA to achieve an n-6/n-3 ratio near 4:1 will contribute to mitigating the risk of developing metabolic syndrome, which includes cardiovascular disease, diabetes and inflammatory disorders.

### **Screening of Cave Bacteria for Antimicrobial Activity against *Pseudomonas aeruginosa* Biofilms**

Mason, Cohord

The bacterium *Pseudomonas aeruginosa* may grow in a biofilm structure which can be up to 1000 times more resistant to antibiotics as compared to planktonic isolates. The *P. aeruginosa* biofilms have serious implications with regards to infection, especially in individuals with weakened immune defenses like burn and cystic fibrosis patients. Antibiotic studies are usually based on planktonic antibiotic susceptibility results, so they may be less effective when used in patients. The aim of this study was to further screen previously studied cave bacterial isolates with potential activity and determine the antimicrobial/antibiofilm capabilities of those against *P. aeruginosa* biofilms. There were 14 cave bacteria isolates grown in different media over 20 days, with collections of supernatant on days 7, 11, 15, and 20. The MBEC device was used to culture *P. aeruginosa* biofilms, which were then exposed to the collected supernatants. After exposure, the surviving biofilms were recovered, and spot plated in order to measure any inhibition of *P. aeruginosa*. Dilution and spot plating were also used to enumerate surviving cells, and give a percent survival quantification of antimicrobial activity. The biofilm cells were only affected by three cave isolates (RA003, A1A3, and PM58B) on day 7. The isolates showed a noticeably decreased percent survival and demonstrated promise for future studies. These cave isolates have now been further studied with more replicates and the anticipated results will be compared with known antibiotics. This study shows that cave bacteria produce antimicrobials that are effective against pathogenic bacteria even in a biofilm structure.

### **A Systematic Look into the Food Preferences of Eastern Grey Squirrels (*Sciurus carolinensis*)**

McAllister, Jillian

The spread of eastern grey squirrels (*Sciurus carolinensis*) is a growing concern in British Columbia for both environmental and economic reasons. Deemed one of the top 100 worst invasive species by the International Union for the Conservation of Nature (IUCN), this squirrel has recently started colonizing the interior of BC. The repercussions of their spread are currently unknown, particularly in regards to how it will affect the region's agriculture industry. In this study, the food preferences of three eastern grey squirrels captured in Kelowna, BC were evaluated. The research was conducted at the BC Wildlife Park from July to October 2014. Agricultural foods grown in BC's interior were presented to the squirrels in cafeteria-style food testing. Each squirrel was offered three foods at a time to determine their order of preference and approximate amount consumed. Eleven food types were tested in eleven combinations with each of the three squirrels, resulting in a total of 99 trials. As expected, the squirrels consumed a portion of each food type offered every trial. Squirrels are known opportunists and

generalists, enabling them to survive in a wide variety of habitats. While the individual squirrels showcased unique food preferences, birdseed, peanuts, cherries, and apples were most frequently preferred. Strawberries were the only food item that was never chosen first over the other food types. Based on the results of this study, further spread of eastern grey squirrels will have negative impacts on BC's agriculture industry due to their generalist-style diet.

### **Tracking Cattle with Infrared Imaging Drones**

McInnes, Matt

Foster, Chris

Cattle ranching in Western Canada is on the cusp of a technological revolution. The old approach of turning the cattle out on the range for the summer feeding season and then collecting them back in the fall via cowboys on horseback is a model dating back 200 years in the Kamloops region. Over the past 25 years some technology has been applied, with the cowboy on a horse in some instances being replaced by a cowboy on a Quad off-road vehicle, for example. Some large ranches even use a helicopter to direct the search for the cattle. Technology has the ability to revolutionize ranching over the next decade with several different technologies being used to track cattle. Drones equipped with infrared imaging equipment show great potential for being a very low cost alternative to the current approaches to searching for cattle. We are prototyping a hardware and software solution to integrate an infrared camera with a dedicated on-board computer to process the video stream in real time. We've assessed some of the available drones, infrared cameras, and durable embedded computers and are now in the process of mounting the camera and computer on the drone. We expect to have software for identifying cattle in the infrared video data working by the end of the project. We aim to provide a low-cost, autonomous alternative to manually searching for cattle.

### **A Look at Changing Views and Beliefs about Animals from 900-1900**

McKeown, Denise

Through literary review of both primary and secondary sources, this presentation looks at the different ways that people in Europe, mainly in the United Kingdom (UK), have viewed animals through history, focusing on the period between 900 and 1900. I want to look past the necessary uses of animals such as food sources, material goods and work animals. Although these aspects will surely come up, I intend to look deeper into the ways that people felt about animals in their daily lives. For example: Did God compel a cow to stand still to be milked and was it the devil's work when she placed her manure encrusted foot into the bucket while simultaneously swatting the milk maid in the face with her muddy tail? I can take a person to court for stealing my grain, can I do the same with the rats in my barn? Are animals merely machines? It is helpful to examine how and what people thought about the animals in their lives throughout history because it sheds significant light onto the morals and ethics that contemporary people and society have surrounding animals and the way they are treated today.

### **Will Canada Meet its Carbon Emission Target by 2020?**

Olsen, Eric

Branchflower, Kelsey

Lam, Jennifer

The primary focus of this research is to analyze Canada's carbon emission target set just after the Copenhagen Accord of 2009. During the convention, nations agreed to act in order to prevent dangerous climate change and keep the global temperature increase below 2 Celsius. Nations agreed to establish (non-binding) specific targets in an effort to reduce emissions. Canada set out to reduce carbon emissions to 17 percent below 2005 levels by the year 2020. This analysis will report on what Canada has done thus far, in addition to what still needs to be done within the next 5 years. Canada will also be compared alongside other countries, both developed and developing, to gain a relative progress status between countries. The data used is largely interpreted by the IPAT equation, which shows that carbon emissions depend multiplicative on population, affluence, and technology. With this equation, it becomes apparent that technology is the factor that must see the most change in order to reduce greenhouse gases, and determines to what scale this needs to occur if Canada intends to meet the Copenhagen Accord targets.

### **How Safe Is Near Field Communication?: A Research Survey**

Palmer, Jeffrey

Rietze, Lucas

Near field communication (NFC) is a short-range contactless protocol that transmits data wirelessly between two devices, whether they are mobile phones, card readers, computers, tablets, and tags. Although the primary use of NFC is for mobile payments, it has many other applications in different commercial fields such as transportation, gaming, healthcare, and marketing. However, security and safety of the personal information are the major concern for a wide adoption of NFC. A successful deployment of NFC is not possible without proper security analysis. This survey presents recent technical research on the problems of privacy and security for the NFC protocol and its associated vulnerabilities. It also presents a background and functionality of NFC technology followed by a classification of various attacks and countermeasure strategies. The survey concludes by pointing out some future directions on privacy and security issue of NFC.

### **Researching Service Access from Adolescence to Adulthood of Individuals with Autism Spectrum Disorder**

Pierobon, Ashley

This research examines the transition period as individuals with autism spectrum disorder age out of the postsecondary school system and enter into adulthood, and the impact this transition has on the individuals and their families. As individuals with autism spectrum disorder transition from adolescence to adulthood, they face individual and social changes that affect services, funding, and life opportunities. This research examines the gaps in service access that are experienced by individuals with autism spectrum disorder living in Kamloops. Throughout this period of transition, it is important that services be offered that support and meet the needs of individuals with differing abilities. This research uses qualitative methods to examine the experiences of individuals that are going through or have been through this transition. This research seeks to uncover the ways in which this transition can fosters social involvement



inclusion, or social isolation and exclusion. Additionally, it seeks to examine how societal discourse surrounding this transition impacts individual identity formation. This research utilizes current academic literature as well as interviews with community members in Kamloops, and will benefit the academic community as well as provide insight into the service gaps that are prevalent in Kamloops.

### **Analysis of Protozoal, Archaeal and Bacterial Communities in Bovine Rumen Fluid before and after the addition of Powdered Red Lake Earth in vitro**

Pyper, Katiana

Bovine cows and other methane excreting ruminants such as sheep are shown to be responsible for approximately 25% of anthropogenic global greenhouse gasses. The object of this study is to determine the effect the feed additive Red Lake Earth (RLE) has on decreasing the production of enteric methane from cows. Methane production by ruminants such as cows is due to archaeal methanogens within the cow rumen reducing carbon dioxide to methane gas in a process called methanogenesis. Bacterial, archaeal and protozoal relationships and abundance within a cow rumen have been seen to have a direct correlation to the amount of methane produced, and the feed additive RLE is hypothesized to decrease the amount of methane produced in a cow by disturbing the methanogen-protozoal symbiotic relationships. Relationships and abundance of protozoa, bacteria and archaeal methanogens from grass-fed cow rumens in vitro will be investigated using DNA extractions from cultures from four separate animals at time 0 and after 48 hours of incubation at 37°C, Polymerase Chain Reaction (PCR) to amplify targeted genes, and next generation Ion Torrent sequencing in hopes of determining the effect of RLE on overall taxonomic abundance and relationships of bacteria, archaeal methanogens, and protozoa.

### **Using Scanning Electron Microscopy to Study Microbial Community in Cave Speleothem Samples**

Randhawa, Arjun

Caves are unique environments that can house many new bacterial species, some of which could potentially produce novel bioactive compounds. Cave systems include many rock and mineral formations, providing unique habitats for these less-studied and possibly rare species of bacteria. Identifying these species can be accomplished in a number of ways, but most of these methods are time consuming and cost-prohibitive for smaller research labs. The aim of this study was to observe and compare cave bacterial isolates on inoculated R2A agar, Gold-Palladium (AuPd) coated speleothem, and uncoated speleothem samples using the Scanning Electron Microscope (SEM). The resulting images were then used to describe morphology of the different organisms and establish which specimen preparation treatment produced the most efficient means of characterization. Based on the morphology of the bacteria found, the study identified similarities among each bacterial community across the different sample types. These similarities could indicate that these bacteria are of the same organisms, and that the cultured bacteria are the same isolates found on the speleothems. The study was able to conclude that the uncoated samples produced images of similar quality to the coated samples. Also, culturing bacteria from the speleothem and viewing them with the SEM proved to be faster than searching the entire speleothem, but risks missing some unculturable species. This study shows that this method may be used as a faster, inexpensive and more efficient way to taking the first steps in characterizing bacteria present in cave speleothem samples.

### **Remote Sensing of Airborne Particulates**

Rankin, Ian

Small particles in the air are dangerous because they can bypass the body's natural defenses and enter the lungs. A 2013 study involving nine European countries showed the lung cancer rate rose 22% for every 10  $\mu\text{g}/\text{m}^3$  increase in particles with a diameter 10 $\mu\text{m}$  or less (PM10), and 36% for the same increase in particles 2.5  $\mu\text{m}$  or less (PM2.5). This is because PM2.5 particles can penetrate deeper into the lungs than PM10 particles. The Air Quality Health Index is commonly used by municipalities to indicate general air quality but it does not explicitly provide particulate concentrations since it is calculated from a 3-hour average of O<sub>3</sub>, NO<sub>2</sub> and PM2.5 concentrations. In response to this an inexpensive, yet effective monitoring device which detects concentrations of particulates is being designed. Our system includes a light scattering sensor that can detect particles of a diameter as small as approximately 0.1  $\mu\text{m}$ , ensuring detection of PM2.5 particles. Particles entering a sampling volume inside the sensor scatter light produced by an infrared diode. Scattered light is then detected by a phototransistor that outputs a voltage proportional to dust concentration to an amplifier circuit. An Arduino Uno R3 board captures and stores data. The data will be transmitted remotely using a 900 MHz XTend 900 1W RPSMA transmission system with a range of 64km line-of-site and 1km indoors. It will therefore have the capability to relay data from an area of interest. Remote data collection will potentially allow for multiple sensors to be monitored at once.

### **Social Interest and Emotion in Relation to Motives for Volunteering**

Rapinda, Karli

Previous literature demonstrates a strong relationship between social interest and measures of emotional well-being. The present study examines the relationships of social interest, emotional well-being, and motivations for volunteering. First- year psychology students will complete questionnaires assessing social interest, positive and negative affect, and motivations (altruistic or selfish) for volunteering. It is expected that individuals with higher levels of social interest will also score higher on measures of emotional well-being. It is also expected that those who score high on social interest will be more willing to volunteer for altruistic reasons rather than for selfish reasons. Finally, it is also anticipated that those high in social interest and altruistic reasons for volunteering will report more positive affect in comparison to those with lower levels of social interest and selfish reasons for volunteering. Anticipated results will be discussed in terms of Adler's concept of social interest (i.e., working with and giving back to the community) and its connection to mental health.

### **Benefits, Costs, Risks, Timing and Limitations of Three Methods to Combat Climate Change**

Ratushniak, Keenan

Melvin, Jon

This research presents and compares three possible solutions to global warming. Each solution will be explored in terms of its benefits, costs, limitations, timing and the risks involved. Complementarity between the different solutions will also be discussed. One solution that we will explore is known as geo-engineering. Another is carbon engineering. These methods will be compared with traditional mitigation strategies. The aim of most mitigation policies is to reduce

greenhouse gas emissions and stabilize temperature increases to levels that will avoid dangerous climate change. Under these traditional mitigation methods, the imbalance observed in the carbon cycle is reduced by decreasing the burning of fossil fuel and land use. The other two solutions, geo-engineering and carbon engineering, have not been explored to the same extent. One geo-engineering method would be to release aerosols into the atmosphere to aid in reflecting the solar radiation for a net cooling effect. Carbon engineering is different from the other two methods. It refers to engineering techniques that remove carbon from the atmosphere. It is a form of mitigation. It acts to provide a balance to the current imbalanced carbon cycle not by reducing existing emissions but by removing them after they are released in the atmosphere. The purpose is to shed more light into some new methods that are being proposed to regulate climate change and thus avoid dangerous levels and extreme climate change which can lead to abrupt non-marginal damages on the planet.

### **Determination of Methyl and Propyl Parabens in Cosmetic Foundations using Liquid Chromatography-Mass Spectrometry**

Reay, Kelsey

Parabens are used in various types of personal care products, including cosmetic foundation. They function as preservatives because they display bactericidal and fungicidal properties. The long term effects of using products containing these parabens have not been extensively studied. Early studies show that parabens may be associated with breast cancer, as they have been detected in breast cancer cells. To help further research on parabens within cosmetic foundation, a liquid chromatography-mass spectrometry method is being developed and optimized to identify both methylparaben and propylparaben. The method is being optimized by altering solvent composition, flow rate, and temperature. Further research would include further optimization and quantification of these parabens in cosmetic foundations.

### **Timing Resolution of M9 Prototype Muon Spectrometer at TRIUMF**

Roberts, Jerin

Muon Spectrometers are designed to probe the fine magnetic structures of new materials. At TRIUMF muons are created using the institutions large cyclotron. These are collected and focused down a beam line leading to the spectrometer. When the muons finally decay inside the sample the positron is released in the direction of the precessing spin of the muon. When the positron passes through scintillation pieces a burst of light is generated. Photo Multiplier Tubes (PMT) are typically positioned at the end of the light guides to detect the incoming light. This allows for the positron trajectory to be reconstructed which ultimately creates a picture of the internal magnetic field of the sample. The M9 spectrometer has been alternatively redesigned using cost effective Silicon Photo-Multipliers (SiPM) which have yet to meet the timing thresholds set by current PMT's. This prompted the investigation of the effects scintillation geometry had on the theoretical timing resolution. An original simulation was created to determine the feasibility of the spectrometer. The simulation incorporates Monte-Carlo style computation which determines the effects of scintillation geometry using SiPM characterization data experimentally gathered Fall 2014 at TRIUMF.

### **Determination of Thymol in Mouthwash Using Capillary Electrophoresis**

Sallis, Kelsie

Thymol is a natural monoterpene phenol derivative of cymene which has strong antiseptic properties. The antimicrobial properties of this compound make it a common ingredient in many products. Many brands of mouthwash list thymol as an ingredient as it fights tooth decay and infection while offsetting the effects of gum disease or bad breath. The amount of thymol present in mouthwash will be determined using capillary electrophoresis (CE). Several experimental parameters, including the voltage, detection wavelength, pH and concentration of the background electrolyte, were optimized. The optimized experimental conditions were used to determine the concentration of thymol in mouthwash samples.

### **Does Bacterial Infection Cause Mortality of Juvenile Marine Invertebrates?**

Sandee, Samantha

Marine invertebrates undergo a significant amount of mortality during the juvenile phase, with many species experiencing well over 90% mortality during that time. This means that this phase is important in determining what the overall adult population size will be, and thus how many offspring are likely to be produced in following years. To predict how much juvenile mortality will occur, the factors that cause mortality in the wild need to be elucidated. While some factors such as heat, desiccation, UV radiation, and predation stress have been established as causes of mortality, it is unknown whether or not bacterial infection also causes mortality. Bacterial infection seems a likely candidate, as bacteria are known to cause mass mortality events of wild adult marine invertebrates and to cause substantial mortality of juveniles reared in the aquaculture industry. This research was carried out in Bamfield B.C. from June to August 2014, exposing juvenile *M. trossulus* (mussels) and *N. ostrina* (snails) to either antibiotics or control treatments. There was no difference in mortality between the treatment and control groups, indicating that bacteria likely cause little or no mortality of juvenile marine invertebrates in natural settings. Further, overall mortality in both the experimental and control groups was low, indicating that bacterial, viral and fungal infections do not cause a substantial amount of mortality. These findings are significant because knowing the factors that cause juvenile mortality can aid in environmental conservation, fisheries management and predicting ecosystem responses to environmental impacts.

### **Dominance Behavior of the Mountain Chickadee (*Poecile gambeli*) in Winter**

Sarmiento de Sotomayor Martinez, Isabel

Chickadees form flocks during the winter to reduce predation rates and increase access to scarce food resources, increasing their chances of over-winter survival. Within these flocks, some species, such as the black-capped chickadee, form dominance hierarchies. The kind of hierarchy they form is referred to as linear, in which the dominant bird will feed with no interruption but can displace any other bird; the second dominant can displace all the birds except for the first dominant, etc. Mountain chickadees, a closely related species that reside in the Kamloops area, also form winter flocks; however, it remains unknown whether they form stable, linear dominance hierarchies, such as those exhibited by black-capped chickadees. In this study, we captured and banded birds from different flocks on the TRU campus and in the Kenna

Cartwright Park and observed their interactions at different feeding stations. The analysis of these interactions will determine whether mountain chickadees exhibit a similar dominance behaviour as black-capped chickadees.

### **BlackBerry 10 PhoneGap Plugins**

Schielke, Stefan

Mobile developers want to create apps that can be coded once and then distributed to many different mobile platforms. This can be achieved by using a mobile web-based application framework such as PhoneGap. PhoneGap can be used to write embedded dynamic websites that run on the mobile device, and can utilize the native phone capabilities on Android, BlackBerry, Firefox OS, iOS, Ubuntu, and Windows Phone via plugins. This project entailed the development of a BlackBerry plugin for PhoneGap. The project was done as part of UCOSP. UCOSP teams up with industry leaders that are working on open-source projects. This provides students with a bridge between university and industry while working on a real-world, live, open-source project. Students don't just learn about open-source software development; they are doing it by working together in a team that is geographically distributed. The plugin that I focused on was the EmailSender plugin. This plugin is used by developers to send data from an app – image, text, crash reports – so that an app can be maintained or improved.

### **Protein Transplant: Purifying Two NtaA Proteins from *Gordonia* sp. NB4-1Y**

Smylie, Laura

Many manufactured products contain organosulfur compounds that are not naturally metabolized and, as such, their use results in toxic environmental contamination. By examining the microbial metabolism of compounds such as 6:2 fluorotelomer sulfonate, a component of firefighting foams, therein lies potential for development of bioremediation tools. To date, the metabolism of 6:2 FTS has been observed in the soil bacterium, *Gordonia* sp. NB4-1Y, which was isolated here in Kamloops. When *Gordonia* was supplied 6:2 FTS as the sole sulfur source, the production of two metabolic enzymes, nitrilotriacetate (NtaA) monooxygenases, was observed. This led to the hypothesis that these enzymes initiate the desulfurization reaction used by NB4-1Y for 6:2 FTS biodegradation. To examine this hypothesis, I isolated genomic DNA from NB4-1Y and used it as a template to amplify the nucleotide sequences coding for each NtaA enzyme by polymerase chain reaction. These genes were then transferred into *E. coli* using a plasmid vector so that they can be sequenced. Once we have determined that the appropriate genes have been isolated they will be moved into plasmid expression vectors that will allow us to produce and purify large quantities of the NtaA enzymes. Once purified, biochemical assays will be performed to definitively determine if these enzymes are involved in 6:2 FTS desulfurization in *Gordonia* sp. NB4-1Y.

### **Application of Nonaqueous Capillary Electrophoresis for Sensitive Determination of Major Carotenoids in Feathers of Bullock's Orioles**

Sparrow, Katie

The brilliant yellow, orange, and red feathers exhibited by many songbirds result from the consumption and deposition of dietary carotenoids in feather tissues. Variation in the brilliance of feather colouration is thus a result of the carotenoid content of those feathers, yet understanding exactly how different concentrations and compositions of carotenoids influence feather colour remains poorly understood. The goal of this project was to develop a rapid and sensitive nonaqueous capillary electrophoresis (NACE) method to quantify carotenoids in bird feathers. This project focused on three major carotenoids: canary xanthophyll A, canary xanthophyll B, and canthaxanthin. We investigated various modes of capillary electrophoresis (CE), such as capillary zone electrophoresis, micellar electrokinetic chromatography, and nonaqueous capillary electrophoresis, using coated and uncoated capillary to determine optimal experimental conditions using photodiode array detection. Several experimental factors were investigated to achieve the optimum conditions for the CE analysis. Using this information, we ultimately hope to understand how carotenoid content and composition reflect feather colour in tail feathers in Bullock's orioles.

### **Chemical Analysis of Cave Speleothem Samples Using Flame Atomic Absorption Spectrometry**

Tong, Brian

Cave bacteria provide possible new keys to produce antibiotics from the environment that are untouched by humans. Knowing more about the cave habitats where these unique microorganisms live and thrive will enhance further study on bacterial cultivation and drug discovery that will help determine the utilization of the secondary metabolites in microbes. The objective of this work was to analyze mineral compositions of the cave speleothem samples using a chemical digestion. Flame Atomic Absorption Spectrometry (FAAS) was utilized to measure cation species in the speleothem samples. Sixteen samples of different cave decorations with variations of soda straw, popcorn, and moon milk were collected by Dr. Naowarat Cheeptham and volunteer cavers including Nick Vieira, Greg Horne, David Wall, Dayon Traynor, Aaron Jones, and Rob Wall. These samples came from different caves in British Columbia and Alberta (i.e., Helmcken Falls Cave, Tupper Cave System, Procrastination Pot, Iron Curtain Cave, and Blue Water Cave). Aqua regia was used to digest the samples thereby isolating metal ions in solution. Several instrumental parameters of FAAS were optimized and the optimized experimental conditions were used to determine elements such as Al, Br, Ca, Cu, Cd, Cr, Mg, Fe, K, Na, Pb, Sr in the cave samples.

### **Edinburgh Heights: Rural-Urban Fringe**

Turner, Stacey  
Rookes, Carley

Liveability is a concept that real estate developers must consider when building new housing on the edge of the city. The purpose of this research is to examine the continuous growth and sustainability of the rural-urban fringe in the neighbourhood of Aberdeen in Kamloops, British Columbia while considering the new residential development of Edinburgh Heights. This study

examined the resources and utilities that are needed to expand communities outwards; the difficulties with new developments in the eyes of city planners, developers, residents and other governing bodies; and the physical hazards in developing on and near the rural-urban fringe. Liveability in Aberdeen involves the life satisfaction of residents in their perceived living situation, including commuting time, access to green space, amenities and city services. Through questionnaires, interviews and literature reviews we have gained a better understanding of the motives of residents to move away from city cores to the rural-urban fringe. With conclusions drawn from our research, we can say that our project contributes to the discipline of rural-urban fringe research.

**Coyote, Friend or Foe?: A Literature Study on the Public Perception of the Widespread Mesocarnivore**  
Viaud, Marie-Elena

There have been many studies done on the public perception of wolves as they have a long standing history of conflict with humans. However, their cousins the coyotes, often seen as more shy and cunning, have, until recently, managed to stay out of the spotlight. Over the past few decades, coyotes have been moving into cities and becoming part of the urban ecosystem, much to the concern of the public. Content analysis of the media is an inexpensive and relatively new way to determine how the public feels towards many different subjects, and is becoming a popular research method in many fields, including nature conservation. Using children's books and newspaper articles (to obtain a larger demographic of people), this study investigates the public perception of coyotes in Canadian cities over the last 30 years, and tests whether news and books are suitable tools with which to investigate the social climate surrounding the coyote. In this study, news articles and books are classified into positive, negative, and neutral categories by evaluating the vocabulary used by the author. The results are then analysed to observe any trends over time and compared to other studies done on coyotes using public surveys to see if any discrepancies exist between the two methods. Results from this study can be used to indicate where resources should be allocated when it comes to managing coyotes, particularly when management involves human/coyote interactions.

**Comparison of Male and Female Student Employment**  
Waithe, David

This research project examines the rates at which students work while studying, determining whether males or females typically work more and why. This examination will help us to better understand what jobs are available to students throughout their studies and if there is a direct correlation to the increasing enrollment of female students. Statistics Canada sources are used gauge data on employment and enrollment to see the changes over the last forty years. Findings show that as the population of female students has increased from thirty-two percent to sixty-two percent of the student population, the percentage of employed female students has also risen vastly. This information is valuable as it signifies the changing landscape of Canadian universities and how it affects the student job market. It also allows us to evaluate whether or not the current system is disadvantaging female students by means of a lack of funding options such as scholarships, bursaries, or tax credits. In conclusion, this paper makes several suggestions regarding how this inequality may be combated and what the potential outcomes could be.

### **Capillary Electrophoresis Method Development for the Determination of Carotenoids in Feathers of American Redstarts**

Wildeman, Paige

A procedure using capillary electrophoresis (CE) with UV absorption detection was developed to determine carotenoids typically found in bird feathers. Carotenoids are a class of pigments contained in all photosynthetic organisms. They have long isoprenoid chains, which are carbon chains with alternating double and single bonds, and may contain numerous functional groups. Many animals develop bright red, orange, or yellow carotenoid pigmentation that act as signals to attract mates. Because animals often obtain several different carotenoids from plant and animal food sources, it is possible that these pigments are accumulated at different levels in the body and may play unique roles in shaping the ultimate color expression of an individual. The goal of this research is to establish optimal CE experimental conditions that could be used for carotenoid detection and determination of carotenoids in migratory bird feathers (American redstart, for example). The current literature shows that these pigments have been analyzed and identified by a number of other different spectroscopic and analytical techniques, including high performance liquid chromatography (HPLC) and liquid chromatography paired with mass spectrometer (LC/MS). However, a CE method is more advantageous due to its rapid analysis time, greater separation efficiency, and higher selectivity, simplicity, and adaptability to a variety of different application conditions. In future, this method could be used as supplementary material in other related research and it could provide a baseline for past and future studies.

### **Analytical Chemistry Lab Development: Investigation of Essential Oil in Cinnamon**

Wraight, Jennifer

Essential oils, such as trans-cinnamaldehyde, are an important component in cinnamon bark. As well as being responsible for flavour and aroma, these volatile oils have been shown to have anti-inflammatory, antimicrobial, antioxidant, antitumor, and other health benefits. With the use of a gas chromatography coupled with mass spectrometry instrument, this project will investigate the rate of essential oil loss from a cinnamon stick once it has been ground to powder form. Since analysis of real samples is one way to improve student engagement in undergraduate laboratories, a first or second year analytical lab can be developed from optimized procedures. It will introduce students to chromatography, spectrometry, and analytical sample preparation techniques. The experimental progress and results to date will be presented.