ORAL PRESENATONS – May 15, 16, and 17, 2019
McDougall Hall, Alex H. MacKinnon Auditorium
Room 242

May 15th

10:15 am - Antimicrobial dry cow therapy for prevention and cure of intramammary infections: a systematic review and meta-analysis

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Background: Intramammary infections (IMI) is one of the main causes of economic losses on dairy farms. Many studies have been published assessing different antimicrobials that can be used to prevent and cure IMI at drying-off. Moreover, statistical methods that allow for comparison of multiple treatments simultaneously (network meta-analysis, NMA) are rapidly expanding and become more accessible, enabling better data synthesis.

Objectives: This review aims to answer the following question: In dairy cows (i.e. the population), which antimicrobial treatment (i.e. the comparators) when administered at dry-off (i.e. the interventions) is the most efficient for eliminating IMI or preventing new IMI (i.e. the outcomes), by combining the results of existing evidence, using conventional and network meta-analysis techniques.

Materials and Methods: Web of Science, CAB Abstracts, PubMed and relevant conference proceedings were searched. Reviewers independently screened abstracts and full texts for eligibility, extract data and assess risk of bias. Mixed-effects meta-analysis comparing active antimicrobials with placebo or no treatment will be employed. Then NMA will be used to compare all alternative antimicrobials.

Results and conclusion: This review will offer a comprehensive assessment of different antimicrobials used at drying-off, guiding decision-makers to the most promising interventions and consequently, improving udder health and dairy industry.

10:30 am - Antimicrobial peptides with activity against major cow mastitis pathogens

Colonia-Orozco Ana María1; Lüders-Post Carlos[2]; Sanchez-Javier[3]; Ceballos-Márquez Alejandro1[1]

1Universidad de Caldas, Colombia
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3University of Prince Edward Island

Introduction: Bovine mastitis is an inflammation of the mammary gland, usually caused by bacteria infection. Treatment is performed with antibiotics, which have the disadvantage to generate residues in milk

causing economic losses for the farmer because of discard milk and becoming a risk factor in the emergence of antibiotic resistant strains when withholding periods are inadequate.

Objective: Search for molecules with antimicrobial activity isolated from bovine intramammary bacteria.

Methodology: Bacteria strains (Coagulase Negative Staphylococci, n=267; *Streptococcus* spp., n=69; *Enterococcus* spp., n=11; and Lactic Acid Bacteria, n=548) were isolated from 275 milk samples from 11 Colombian dairy farms, whose free cells culture broths were tested for antimicrobial activity against *Staphylococcus aureus* and *Streptococcus agalactiae*, by the agar well diffusion method. Antimicrobial substances from culture supernatants were characterized as peptides by their sensitivity to protease activity.

Analysis: 4.5% of isolates exhibited antimicrobial activity against both indicator strains with 1.5% and 1.2% having activity only against either *Staphylococcus aureus* or *Streptococcus agalactiae*, respectively. Antimicrobial substances seem to be Bacteriocin-like inhibitory substances (BLIS).

Conclusions: BLIS identified in this study might provide alternative intervention strategies for the control of bovine mastitis. However, further laboratory and field-based studies are required before recommending their use.

10: 45 am - Vaccination for Bovine Viral Diarrhea virus in Atlantic Canadian dairy farms and its relationship to antigen and antibody test results from bulk tank milk

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Vaccination for Bovine Viral Diarrhea virus (BVDv) has become common throughout the world as part of disease control programs. Bulk tank milk (BTM) testing has been used to screen herds for persistently infected BVDv individuals. The study objectives were: 1) to determine levels of BTM BVDv infection and BVDv vaccine use on dairy farms in Atlantic Canada; and 2) to determine the relationship between the BTM BVDv test results and vaccine usage. All dairy herds in Atlantic Canada underwent BTM testing for BVDv using polymerase chain reaction (PCR) and enzyme linked immunosorbent assay (ELISA), revealing 3.5% and 83% of herds testing positive (or suspect positive on PCR) for antigen and antibody, respectively. A total of 243 dairy producers in Atlantic Canada (36.4% response rate) completed a BVDv-vaccine survey, showing 168 (70%) responding producers used BVDv vaccine within the previous year. Of these vaccinating producers, 53.6% used only modified live vaccine (MLV), 9.5% used only killed vaccine, and 36.9% used both MLV and killed vaccine. On BTM, 98.4% of herds reporting BVDv vaccine use were antibody positive, while 61.2% of herds not reporting BVDv vaccine use were antibody positive. Of the 7 PCR positive and 7 suspect positive herds, thirteen (92.8%) were vaccinated. The herd-level prevalence of BVDv based on PCR results was between 3.7-8.0% in Atlantic Canada, dependent on province. BTM PCR positive results in substantial numbers of vaccinated herds suggest possible breaches in biosecurity and/or vaccination protocols, which should be assessed with further research.

11:00 am - Can heart rate variability be used as an indicator of pain in veterinary teaching hospital equine patients?

Jaclyn M. Kaufman[1], Laurie A. McDuffee[1], William J. Montelpare[2]

[1]Departments of Health Management, Atlantic Veterinary College, and [2]Applied Human Sciences, UPEI, Charlottetown, PEI

Heart rate variability (HRV) describes fluctuations in heart beat-to-beat intervals, which are mediated through input from the autonomic nervous system. Measuring HRV is non-invasive, and HRV analysis can be used to evaluate the balance between sympathetic and parasympathetic nervous system activity. Pain states are thought to cause a shift towards sympathetic activity, making HRV a potential pain indicator. This study aims to determine if HRV measures can be correlated with behavioural and physiological measures of pain in horses. On admission to the hospital, data collected from patients included HRV measures, salivary cortisol, and pain scores. Horses receiving surgery had subsequent data collected upon recovery from anesthesia (recovery) and immediately prior to receiving post-surgical analgesics (post-surgery). When categorized by pain status on admission, preliminary data (n = 50) revealed increased SDNN and RMSSD ($p<0.01$), and total power ($p<0.015$) in the painful group. Matched data from surgical patients revealed only HR significantly changed with surgery (admission vs. recovery $p<0.01$, admission vs. post-surgery $p=0.021$), with HR being highest on recovery. Further data analysis will investigate if a correlation can be identified between HRV and behavioural and physiological indicators of pain, as such an estimate is valuable to understanding pain in equine patients.

11:15 am - Effect of assay conditions on H_2O_2 emission in heart mitochondria

Michael O. Isei and Collins Kamunde, Department of Biomedical Sciences

Accurate quantitation of mitochondrial reactive oxygen species (ROS) production is important to better understand their roles in normal physiology and pathology. The Amplex UltraRed-horseradish peroxidase (AUR-HRP) system is used for fluorogenic measurement of ROS generated in biological systems. However, the effects of assay conditions on this system are rarely assessed. We probed the effects of copper (Cu), protein concentration, and mitochondrial substrate type and concentration on the AUR-HRP H_2O_2 detection system. We found that Cu inhibited the AUR-HRP system in a concentration-dependent manner. The maximum inhibition was 32% observed at 100 μM Cu. Increasing the HRP concentration did not surmount the inhibitory effect of Cu suggesting that Cu alters the redox chemistry of AUR. Titrating mitochondrial protein with H_2O_2 emission imposed a non-monotonic concentration-response curve wherein 0.25 mg/ml protein supported higher emission rates than lower or higher concentrations. This suggests that optimization of the protein:AUR:HRP ratio is necessary. Additionally, we found that the optimal concentrations of substrates were ≤5 mM because at higher concentrations they inhibited mitochondrial respiration which has implications for H_2O_2 emission. Clearly, optimizing mitochondrial protein/substrate concentrations and testing chemicals used in the assay for potential inhibitory effects are essential prior to using the AUR-HRP H_2O_2 detection system.

11:30 am - Conservative Management of Metatarsal Fractures in a Dog

Sheila Hoe

Atlantic Veterinary College, University of Prince Edward Island, Charlottetown, PEI

A 7-year old female spayed dog presented for acute left pelvic limb lameness after jumping off a boat. Physical examination and orthopedic examinations were normal with apart from a non-weight bearing lameness on the left pelvic limb with crepitus, pain and soft tissue swelling located at the level of the metatarsals.

Imaging revealed closed, complete proximal fractures of all four metatarsals with mild plantar, medial-lateral displacement. Fracture of the 2nd metatarsal was highly comminuted with mild comminution in the 3rd and 4th metatarsal and a transverse fracture in the proximal 1/3 of the 5th metatarsal. Conservative management with an external coaptation (custom made splint) was elected.

The bandage was changed weekly to ensure any monitoring for pressure sores and secondary bacterial infections due to moist dermatitis. Recheck radiographs were taken 4 and 8 weeks after the initial accident and showed proper bone healing. External coaptation was removed at 8 weeks and the fracture sites were noted to be stable on palpation. This case shows evidence that conservative management is a valid option for metatarsal fractures in companion animals. However, case selection is still important and owner would have to be compliant and vigilant with external coaptation.

1:15 pm - Mental Health Screening in Prince Edward Island Schools

Sparks, S., Montelpare, W.J. (Supervisor - UPEI), Stryhn, H. (Co-Supervisor- UPEI)

Background: This research will determine the most applicable screening tool for PEI Student Wellbeing teams to allocate student-clients into the appropriate mental health service programs. Student program allocation is based on the responses to the screening tools that provide mental health symptom reporting about their perceived conditions without a diagnosis. Two screening tools included are The Brief Child and Family Phone Interview (BCFPI) and the Global Appraisal of Individual Needs Short Screener (GAIN-SS).

Method: This research will work directly with the Student Wellbeing Teams in PEI Middle and Secondary schools to test the reliability, comparability and consistency of the two screening tools to select the most applicable tool for use within the schools. A test-retest reliability approach will be completed in five families of schools in PEI to measure the statistical stability of the screening tools. Symptom reporting will be compared between the BCFPI and the GAIN-SS to establish a consistency in reporting. Lastly, a child psychologist will act as a blinded external validator for the recommended allocation of students into support services. This will establish a level of consistency between the child psychologist and Student Wellbeing team recommendations.

1:30 pm - In the Realm of a Retiring Emperor: Japan's Heisei Era in the West, 1989-2019

Michael Pass - Masters of Global Affairs Program, UPEI

On 30 April 2019, Emperor Akihito will abdicate after 30 years of rule, and event which will no doubt be covered extensively both internationally and in Japan. Given this, it is timely to offer a retrospective on the Heisei Era, and how it has been understood and interpreted outside of Japan. Historically, and irrespective of

what the country itself has thought about its place in the world, Japan has always been a useful "idea" for Western observers. During the Heisei era, this has meant that Japan is often pigeonholed as the epitome of a globalized nation in a globalized world, where its culture and businesses (like Sony) have brand name recognition. Or, as another group of Westerners with more xenophobic tendencies have argued, it is an ethnically "pure" nation-state with an obedient and well-behaved population worthy of emulation by immigration-heavy Western nations. My presentation will deconstruct this Western dichotomy of "Japan: The Globalist" and "Japan: The Nationalist" to explore how Western nations have attempted to use the idea of Japan during the Heisei era to fulfill their distinct ideological goals, and how these arguments have meshed with the reality of life for Japanese citizens during this era.

1:45 pm - The Threat of Antibiotic Resistance on Global Health

Emma McDermott, Dr. Christina Murray, and Dr. James Moran

Masters of Global Affairs Program, UPEI

One of the largest public health risks currently facing the world is antibiotic resistance. Antibiotic resistance is when bacteria develop a resistance against antibiotics that could previously have been used to treat them. The Organization for Economic Co-operation and Development (OECD) predicts that by 2050 an estimated 2.4 million deaths, in North America, Australia, and Europe alone, will be due to drug-resistant infections. Humans have become increasingly dependent on the success of antibiotics at treating bacterial infections, and therefore the looming threat of resistance is a critical global threat. This mini-thesis project is a part of UPEI's Master in Global Affairs program in partnership with the Universidad Rey Juan Carlos in Spain. It will use a multi-disciplinary approach to examine the threat antibiotic resistance poses on global health. Topics considered will include the causes of antibiotic resistance, the effects of widespread antibiotic resistance on social, economic, and political factors, and current global preventative actions/programs. Antibiotic resistance is a major emerging health risk, and the extent of its impact is underappreciated in the global community.

2:00 pm – While "Free" Trade Fosters Economic Growth "Freer" Trade May Not

Cheryl Carmichael – Masters of Island Studies, UPEI

This study examines trade policies and the pursuit of economic growth. We explore two preferential trade agreements (PTAs), Pacific Island Countries Trade Agreement (PICTA), and South Pacific Regional Trade and Economic Co-operation Agreement (SPARTECA) plus the World Trade Organization (WTO) from the perspective of regional economic growth for the small island developing states of the Pacific (SIDS of the Pacific). The objective of this study is to provide evidence of support in identifying the type of trade policy which best complements the unique economic trading environment of the SIDS. In a dynamic panel data regression model with a large dataset covering thirteen SIDS of the Pacific from 1970 to 2010 evidence was found to suggest that a discriminating trade environment (PICTA) provides for greater positive influence upon growth than the non-discriminating environment found within a WTO membership. Unfortunately, the process used found evidence on SPARTECA to be elusive.
Our findings support the assumption that the level of openness to trade impacts growth and that a negative response could imply difficulty in achieving and maintaining a competitive level within imports. We summarize, with respect to the SIDS of the Pacific while "free" trade fosters economic growth "freer" trade may not.

2:15 pm – The Inertia of Islandness

Margaret Paterson - Masters of Island Studies Program, Prince Edward Island
When islandness trumps nationalism: The role of island identity and social capital in creating strong subnational island jurisdictions

Attachment to one's island plays a role in islanders' sense of identity, built on social capital such as sense of belonging, stubborn independence, community and kinship webs, and strong bonds with the past. A small-scale society isolated from the mainland may exhibit a distinctive culture in the guise of an inferiority complex, or it may feel superior to the mainland – and sometimes both at the same time. How this sense of identity is manifested in relation to the metropole or outsider plays out in everyday life, through indicators such as a common mythology, and the power to tell one's story. This paper will focus on research undertaken in Newfoundland and Prince Edward Island, identifying social capital indicators on these islands, and assessing the successes and challenges on each island.

2:30 pm - Using Climate Data and Models to Assess the Potential for Growing Theobroma Cacao in the Florida Keys

Eric Gilbert – Masters of Island Studies Program, Prince Edward Island

The cultivation of *Theobroma cacao*, the source of all chocolate products and their derivatives, is under threat due to climate change. Cacao is traditionally grown between 20º North and South of the equator, an area known as the cocoa belt. While climate change is reducing the potential for cacao cultivation in many regions within the cocoa belt there may be new possibilities in areas once considered marginal. Although outside of the cocoa belt by at least 4.5 º Latitude, South Florida and the Florida Keys have the only tropical climate in the continental United States and there are references to cacao growing there going back to at least 1936. The research for this thesis collects weather station data from the Florida Keys and analyses historic climate conditions. This data is also used to model future climate scenarios. The data analysis and climate models are then compared to the growing requirements for *Theobroma cacao* to assess the potential for cultivating cacao in this region. Early results indicate that it is possible to grow cacao at present. Climate models indicate better future conditions with regards to temperature and also show a beneficial increase in overall annual precipitation but this rainfall would not be spread evenly throughout the year and that consecutive dry months may hinder cacao cultivation.

3:15 pm - Selection of scientific indicators for understanding and communicating climate change impacts and adaptation on PEI

Don Jardine[1], Adam Fenech[1], Xander Wang[1], Josh MacFadyen[1], and Donald Moses[1]

[1] University of Prince Edward Island

Selection of the most useful climate change indicators to track changes over time must consider the drivers of climate change, changes to the climate and impacts on physical and biological systems for the geographic area under consideration. For each indicator several questions need to be discussed on what the indicator shows, why it is important and what factors influence the indicator. Technical considerations including the characteristics of the strengths and limitations of the data, complemented by graphs, maps and other visual techniques are essential components to support the reliability and understanding of the indicator. Indicators must also be easily communicated to stakeholders, decision makers and the public. Tools for the extraction

of quantitative data from qualitative historical records such as diaries or personal journals can assist with providing data for time periods when instrumental records are not readily available. Methodologies for extraction of PEI weather observations from scanned Government of Canada weather records from 1872 to 1950 will be explored to provide further insights into the climate history of the province. Techniques for data management and presentation can assist with communicating the story of a changing climate in an island province where weather and climate are important for everyday life.

3:45 pm - In Situ Fermentation as a New Approach for Natural Product Discovery

Vernon Ptycia-Lamky, Brad Haltli, Doug Marchbank, & Russell Kerr

Natural products are a quintessential pillar for drug discovery, such that over 50% of all modern drugs are derived from natural products. Many of these natural products originate from microorganisms. However, the increased rates of rediscovering known natural products using standard laboratory methods has limited the rate of discovering novel chemical structures. With the raise of antibiotic resistance causing a global health and food concern the need for new drugs is in high demand. Genome sequencing of microorganisms has revealed that they can produce more natural products than we once thought. The microbial biosynthetic gene clusters encoding these natural products are not expressed using standard methods and the corresponding natural products are known as "silent". In an attempt to turn on the expression of silent natural products, we conducted a metabolomics analysis of a new *in situ* cultivation method with four *Streptomyces spp.* isolated from different marine habitats in San Salvador, Bahamas. Alterations in the metabolome profiles suggest that natural product production is highly dependent on the specific habitat in which the fermentations were conducted. Our data suggests that chemical signaling in a microbe's natural habitat may be important for the activation of silent natural products.

4:00 pm - Climate Change Impact Assessment and Mitigation Strategies for Sustainable Water and Agriculture Management in PEI

A.Z. Bhatti, A. A. Farooque, B. Acharya, Nick Krouglicof

Canada is badly impacted by the climate change. Although temperature rise in Prince Edward Island (PEI) is relatively less yet it is more vulnerable to extreme weather events due to its specific location. Particularly, the precipitation patterns are evidently following short duration – more intense trend. The 30-years normal precipitation is uniformly distributed @ 80-120 mm/month, however during 1981-2010, events above 250 mm/month have doubled and 80% of those above 300 mm/month had occurred during 1990-2010. Likewise, around 100 mm of rain fell in less than 90 minutes on 24 July, 2016. This poses serious water and agriculture management issues like loss of rainfed agriculture (1 billion $), heavy surface runoff, soil erosion, nutrient loss and diminishing groundwater recharge etc. Delineated hydrological modeling is being conducted for water budgeting, weather and climatological changes impacts on the water balance, future water availability under different projections and its impacts on rainfed agriculture. The study would help evaluate its financial implications and thus pre-feasibility of supplemental irrigation withdrawals for rainfed agriculture. Presumably, the climate change impacts here are not likely to affect household water supplies; however rainfed agriculture is at stake. The study would help formulate sustainable water and agriculture management strategies.

4:15 pm - Beer Bitterness and Raman Spectroscopy

Ben Cudmore - MSc Molecular and Macromolecular program

Beer primarily derives its characteristic bitterness from the addition of annual flowers from the perennial climbing vine Humulus lupulus, better known as hop cones. Hop cones contain a group of non-bitter molecules called humulones which can be thermally isomerized into intensely bitter isohumulones during the brewing process or oxidized during hop storage and processing to form moderately bitter humulinones. Despite significant contributions to beer quality, the degree of humulone isomerization and oxidation is often overlooked in microbreweries. This oversight is the result of current method limitations; on-site testing of these parameters require expensive equipment and intense sample preparation whereas results from off-site analysis can take days to obtain. In attempts to address this deficit in quality control, Raman Spectroscopy is being explored as a cost-effective, point-of-need, non-destructive technique for measuring sensory bitterness in wort (unfermented beer). Preliminary data using a B&W Tek NanoRam Mini with an excitation wavelength of 785 nm and TE-cooled linear Charged Coupler Device (CCD) detector exhibits strong fluorescence in wort samples. Methanol has been explored as a molecular probe for the assay of hop bittering molecules in unfermented beer.

4:30 pm - Synthesis and Characterization of Fluorescent Metal Organic Frameworks Using Terephthalic Acid

Brittany Handke, Dr. Brian D. Wagner

Metal Organic Frameworks (MOFs) are interesting types of solid materials that have a wide range of intriguing structures and applications. These chemical materials are highly porous lattice structures that are made up of metal centers attached by organic linker chains. A fascinating property of a certain class of MOFs is their ability to fluoresce, i.e. to emit light upon UV irradiation. MOF fluorescence is often used in applications such as visual detectors for other compounds which act as guest molecules in the framework. The purpose of this study is to examine the synthetic method of making MOFs and the differences in the fluorescence and chemical structures between the synthesized MOFs. The metal centers and organic linker chains are varied which alters the structure of the framework and the chemical properties, including the fluorescence of each different combination of metal and organic ligand. In this research, the MOFs are made with two similar organic ligands: terephthalic acid (TPA) and 2-hydroxyterephthalic acid (HTPA); TPA is inherently non-fluorescent in solution whereas HTPA is inherently fluorescent in solution; and various metal centers. The goal of the research is to prepare, characterize, and test some new fluorescent MOFs, with potentially useful applications as optical sensors.

4:45 pm - Diatoms loaded self-assembled nanomaterial for Drug Delivery

Anayet Kabir, Marya Ahmed; Department of Chemistry, UPEI

A rapidly expanding field that utilizes nature-inspired materials to create novel and functional biomimetics is known as “Biotemplating”. The diatomaceous earth is an exceptional template for drug delivery applications, owing largely to its highly-ordered pores, large surface area, species specific architecture, and flexibility for surface modifications. Diatomaceous earth have been studied in a wide range of biomedical applications but their potential as the next frontier of drug delivery has yet to be fully exploited. Diatoms are

porous silica-based materials obtained from single cell photosynthetic algae. We are evaluating the potential of diatomaceous earth (DE) microparticles for the duel delivery of drugs as cancer therapeutics. The study described the self-assembly of adamantine modified diatomaceous earth in β-cyclodextrin architecture to prepare thixotropic gels of varying mechanical properties. The gels produced exhibit excelled drug absorption capacity and colloidal stability under different pH. The co-encapsulation of drugs in diatomaceous earth containing thixotropic materials is studied and their in vitro anticancer activities are evaluated.

May 16th

9:00 am - Precision Irrigation Strategies for Sustainable Potato Production on Prince Edward Island

H. Afzaal[a], A.A. Farooque[a], Q.U. Zaman[b], B. Acharya[a], T. Esau[b], N. Hussain[a]

[a]University of Prince Edward Island, Charlottetown,PE,Canada
[b]Engineering Department, Dalhousie University, Faculty of Agriculture, Truro, Nova Scotia, Canada

Potato industry significantly promotes the economy of Prince Edward Island (PE) as it contributes about 10.8% to the GDP of this province with more than one billion direct and indirect economic benefits engaging 12% of total work force of the island. Majority of potato production in PE is rainfed. Potato tubers are highly sensitive to water drought, which drastically reduces tuber yield if supplemental irrigation (SI) is not scheduled. Rainfall patterns are very un-even due to climate change adding more severity to the problems faced by PE's potato farmers. This study evaluates the benefits of using irrigation scheduling, hydrological modeling, and SI for sustainable irrigation water management in potato fields. The CROPWAT model was used to test whether the rainfall is enough for sustainable potato production in PE or SI is needed in addition to rainfall. The model used last 25 years of climate and soil data. Results showed that the predicted rainfall from the model did not satisfy the crop water requirements of potatoes resulting into at least 29% deficit of irrigation. Pressurized irrigation systems including sprinkler and drip irrigation were installed at small-scale to evaluate the impact of scheduled SI to offset deficit in irrigation as compared to conventional practice of rain-fed conditions; i.e., no irrigation practice (control). The results suggested that there was significant difference between crop water requirements (reference evapotranspiration) and available rainfall. Fertigation system was the most efficient irrigation system in terms of water use efficiency (0.46 kg/gallon). The potato yield was 10% more for sprinkler irrigation system and 7% more for fertigation system in comparison with control in selected fields. Future work is planned to use machine learning for efficient irrigation scheduling.

9:15 am - 3D bio-printing of starch-chitosan scaffolds for neuron cells

Haley Butler[1], Emad Naseri[1], Debra MacDonald[2], Dr. Andrew Tasker[2,3], and Ali Ahmadi[1*]

[1] Faculty of Sustainable Design Engineering, University of PEI
[2]Department of Biomedical Sciences, University of PEI
[3]Department of Clinical Medicine, Aarhus University

In this study chitosan and potato starch scaffolds where fabricated and investigated to determine their viability for use as tissue engineering substrates. Both chitosan and potato starch have been studied for use as tissue engineered scaffolds with methods of fabrication ranging from solvent evaporation, freeze drying and molding techniques. Using natural materials, such as chitosan and potato starch for 3D bioprinting applications can offer enhanced structure and property combinations that can constitute as a viable alternative for scaffold materials.

In this work, the printability of a starch-based chitosan composite materials for use in tissue engineering applications is evaluated using Whitaker et al. approach for printability. This is done by measuring the filament formation, shape retention and the degradation of the material. The composites range from 100% potato starch to 100% chitosan. Moreover, the cytotoxicity of the suggested materials and the viability of printed cells within the scaffold material is investigated. The cells used for this study are Neuro2A neuroblastoma cells. Two approached are taken: i) cells are seeded onto the scaffold material; and ii) cells are incorporated into the material prior to printing. The research results can lead to development of reliable, inexpensive *in-vitro* models for pre-clinical neurological disease drug discovery.

9:30 am - Sea lettuce to biocarbon and biogas with recovery of nutrients

Ankita Shrestha, Bishnu Acharya, Aitazaz Farooque

Facutly of Sustainable Design Engineering, University of Prince Edward Island, Charlottetown, PE

Human activity in Prince Edward Island contributes to over 90% of nitrate in island waterways. Increase in nitrate level is responsible for excessive growth of sea lettuce which blocks waterways, causes anoxic event and harms aquatic life. In this study, an integrated process of hydrothermal carbonization (HTC) with anaerobic digestion is used for turning sea lettuce into hydrochar and process water. While previous works on hydrothermal carbonization is limited to batch type reactor, a semi-continuous reactor has been developed for this work. The operating conditions for HTC processing were 150 °C, 180 °C, 200 °C and 220 °C for 30, 60 and 120 minutes. The effects of these operating parameters on final products were studied. The severity factor increased with temperature and time which increased the heating value of the hydrochar. The heating value was in the range of 14 to 20 MJ/kg with energy densification of 1.3 to 1.96. The ash content in the hydrochar reduced after carbonization process making it suitable for use in energy generation. Carbon recovery was in the range of 23% to 39% with increase in C:N ratio. Nitrate analysis showed that nitrate in sea lettuce was carried away by process water.

9:45 am - Smart Sprayer Development for Site Specific Applications of Agrochemicals using Deep Neural Networks

N. Hussain[a], A.A. Farooque[a], A.W. Schumann[c], B. Acharya[a], Q. U. Zaman[b], H. Afzaal[a]

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Prince Edward Island (PEI), Canada is leading potato producing province, contributing more than $1 Billion to provincial economy every year. Currently, agro-chemicals (herbicides, pesticides and fungicides) are applied uniformly with inadequate attention being given to the substantial variations in plants, weed and disease infestations within potato fields. The over use of agro-chemicals in unwanted areas results in an increased cost of production and threatens the environment. This study was designed to develop a smart sprayer consisting of a sensing and control system to accurately apply agrochemicals on an as-needed basis (fungicides on plants and herbicides on weeds only). Five potato fields were selected in PEI and New Brunswick and images were collected with a Canon PowerShot SX540 HS camera, keeping in view the spatial and temporal variations. Varying outdoor light conditions (clear, cloudy, and partly cloudy) and shadow effects were taken into consideration for accurate detection of targets. A database was built and images were labelled (weed, disease, bare soil and plants) for further processing using deep learning technique. Three deep convolutional neural network models were used for classification and detection of weed and disease accurately. The training of machine learning algorithms and testing processes were implemented in DIGITS using convolutional architectures for fast future embedding. Results showed excellent performance in weed and disease detection with accuracy ranging from 90 to 99%. Using the trained the models, custom software will be developed to facilitate on-the-go sensing of targets. The software and hardware components (nozzles, flowmeters, variable rate channel controller, valves, etc.) will be integrated, lab tested, and incorporated into a prototype variable rate sprayer to achieve site-specific applications. The performance of the developed smart sprayer will be tested and evaluated in selected potato fields for targeted application of herbicides and fungicides. The spot-application of agrochemicals in weed and disease areas of the field has a strong potential to improve farm profitability and mitigate environmental risks.

10:00 am - Simulation and Parameterization of Floating Wind Turbine Farms with Shared Moorings

Patrick Connolly, UPEI FSDE, Matt Hall (UPEI FSDE)

As the global demand for renewable energy increases, the offshore wind energy industry is growing to help meet this demand. To install wind turbines in offshore sites with deep water, wind turbines must be mounted on a floating platform. The cost of floating offshore wind turbines (FOWTs) is much greater than that of onshore wind turbines because floating platforms and moorings are required. One strategy to minimize cost is interconnecting mooring lines of adjacent FOWTs in a farm, this is known as shared moorings. It has been shown that use of shared mooring lines can reduce the overall cost of small-scale FOWT farms.

To maximize the cost benefits of shared moorings, an optimization framework will be developed. A numerical model for a FOWT has been developed for use in this optimization and has been verified against existing models. As well, a list of parameters that fully describe a FOWT farm with shared moorings has been developed. This parameter set will be varied by the optimization algorithm to find cost optimal designs. Ultimately, the goal of this project is to use this optimization method to illustrate the cost savings possible with shared moorings and to facilitate future FOWT farm design.

10:30 am- Applications of Nanocrystalline Cellulose Isolated from Local Invasive Tunicates

Matthew J. Dunlop [a,b], Bishnu Acharya[a] and Rabin Bissessur[b]

a) Faculty of Sustainable Design Engineering &

b) Department of Chemistry, University of Prince Edward Island

Nanocrystalline cellulose (NCC) is a high value product, which consists of the nanoscale crystalline region of the cellulose polymer. Tunicates are marine invertebrate animals, partially comprised of tunic tissue which acts as a skeletal structure. Tunic tissue is the only known animal source of NCC. Tunicates require a support to grow and spawn, which they find in the form of mussel socks in Prince Edward Island (PEI). This greatly affects mussel yields, and has become a nuisance to island fishermen. The present work is studying the feasibility of producing high value NCC from tunicates, which represents the first time tunicates have been utilized as a resource on PEI. Following NCC isolation, we demonstrate its value in a number of advanced applications. By demonstrating scalable NCC isolation from local tunicates and providing several examples of the useful high-value nature of this sustainable nanomaterial, we seek to change how the public view invasive tunicates. Not as a nuisance species to be mitigated and contained, but rather as a valuable resource to be harvested and utilized. Moving toward a real solution for local aquaculture, while shedding light on a valuable renewable resource previously thought to be exclusively a nuisance species.

10:45 am - Synthesis of Novel Antimicrobial Peptide-Polymer Hybrids

Nauman Nazeer, Marya Ahmed

Faculty of Sustainable Design Engineering

The vast majority of commercial antibiotics are used in animal production as feed additives to promote livestock growth, instead of disease prevention. The overuse of antibiotics in livestock production has led to increasing microbial resistance among foodborne pathogens. Microbial resistance in zoonotic pathogens poses a serious threat to public health as many of the same antibiotics administered to livestock are also used to treat humans. As regulatory authorities push for greater restrictions on the use of traditional antibiotics in animal production, there is a growing demand for new classes of antimicrobial drugs. Antimicrobial peptides, or host defense peptides, are promising candidates for the next generation of antibiotic drugs. The major drawback to the clinical application of these peptides is their rapid proteolytic degradation in the body. Conjugation of antimicrobial peptides to a suitable biocompatible polymer could help prevent their degradation and maintain their stability in physiological conditions. This presentation discusses the development of antimicrobial peptide-polymer hybrids. The antimicrobial peptides are derived from the avian protein Angiogenin-4. The polymers are derived from the chain growth polymerization of B5AMA, a chemically modified analogue of pantothenic acid. Antimicrobial peptide-polymer hybrids provide a promising new form of treatment for bacterial infections in domestic livestock.

11:00 am - Development of a fully automated portable and smartphone-operated saliva-based cortisol biosensor

Rodolfo Nino-Esparza[1], Laurie McDuffee[2], William Montelpare[3], Ali Ahmadi[1]

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Cortisol, a steroid hormone, is essential in a variety of physiological processes and follows a circadian rhythm throughout a day-night cycle. Abnormal levels of cortisol can be attributed to diseases, but most notably, it is a cause of stress. Therefore, cortisol is known to be a stress biomarker. Saliva-based cortisol sensing has the advantage of obtaining samples in non-invasive, minimal discomfort method, and minimizing additional stress. Developing devices for point-of-care analysis of salivary cortisol has become essential to identify environmental and behavioural triggers towards stress. Point-of-care analysis systems must be portable, easy to use, fast, and cost effective. However, standard methods of measurement such as enzyme-linked immunosorbent assay (ELISA) are time-consuming, expensive and challenging to implement in point-of-care applications. In this presentation, the use of lateral flow assays (LFA) in the quantitative measurement of cortisol in saliva for point-of-care applications is presented. The implementation of an image analysis technique and integration of bio-sensing mechanism with smartphones are discussed.

11:15 - Biochar Assisted Municipal Wastewater Treatment and Nutrient Recycling

A. Pokharel, A. Farooque, B. Acharya

Faculty of Sustainable Design Engineering University of Prince Edward Island, Charlottetown, PEI

Pyrolysis can be used for energy production from waste biomass of agriculture and forestry. Biochar is the solid byproduct of pyrolysis and its cascading use can offset the cost of the process. A wide variety of research on biochar has highlighted its ability to absorb nutrients, metal and complex compounds; filter suspended solids; enhance microorganisms' growth; retain water and nutrients as well as increase carbon content of soil. In addition, sustainable biochar systems are an attractive approach for carbon sequestration and total waste management cycle. Commercially available biochar from Sigma Aldrich was studied for adsorption of nitrogen from effluent of municipal wastewater treatment plant. Adsorption isotherm and breakthrough curve were determined for the biochar. Similarly, biochar's effects in aerobic as well as anaerobic bioreactors were also studied. In both cases the biomass was increased in presence of biochar. The amount of gas produced for anaerobic digestion of fruit mix (apple and banana) was similar but the rate of production was significantly faster in biochar fed reactors. The cumulative goal of the study is to use biochar in various wastewater treatment units to optimize utilization and add value before being used as a soil amendment.

11:30 - A Novel Approach to Product Lifecycle Management and Engineering Using Behavioural Models for the Conceptual Design Phase

Stephen Peters, MSc Student, Clément Fortin, Research Supervisor2
Dr. Grant McSorley, Research Supervisor1

1University of Prince Edward Island, Charlottetown, Canada
2Skolkovo Institute of Science and Technology, Moscow, Russia

The engineering conceptual design phase is often characterized as being in a constant state of flux due to numerous iterations. The role of PLM systems is to manage the people, processes and products involved in developing and sustaining a product to increase stakeholder satisfaction and product quality while reducing

lifecycle costs. Currently, PLM systems are not optimized for the support of the conceptual design stage. A primary reason for this is their reliance on the product structure as the framework for organizing design data. The hierarchical product structure follows the physical configuration of the product, and thus when significant and numerous design changes are implemented, it is difficult to maintain a coherent product definition, and can lead to inefficient management of product information. The extended SAPPHIRE model of causality is proposed as an appropriate basis for the data structures of a PLM system. This paper will provide the methodology and reasoning for the new model framework, as well as a proof of concept based on a CubeSat case study. A future tool could prove to be more consistent and easier to use for conceptual design and will be part of a larger goal of revolutionizing PLM for the entire lifecycle.

1:00 pm - Effect of temperature and cadmium on mitochondrial hydrogen peroxide homeostasis

Chidozie N. Okoye, Collins Kamunde, Department of Biomedical Sciences

A corollary of mitochondrial substrate oxidation and electron transfer for ATP generation is reactive oxygen species (ROS) production as superoxide anion radical and hydrogen peroxide (H_2O_2). To illuminate how stressors modulate mitochondria ROS homeostasis, we investigated the effects of temperature and cadmium on H_2O_2 emission and consumption in rainbow trout liver mitochondria under different bioenergetic states. We show that H_2O_2 emission rates increase with temperature irrespective of the bioenergetic status and cadmium exposure. Energizing mitochondria with malate-glutamate or succinate increased the rate of H_2O_2 emission. Interestingly, malate-glutamate imposed a hyperbolic concentration-response curve that plateaued at 5 µM, while succinate evoked a biphasic response characterized by a spike in the emission rate at 1 µM cadmium followed by gradual diminution at higher metal concentrations. The biphasic H_2O_2 emission response emanated from site II_F (complex II) with some contribution from site III_{Qo} (complex III) while the hyperbolic response was consistent with effect of cadmium on site I_F (complex I). Cadmium, temperature and bioenergetic status did not affect the kinetics of H_2O_2 consumption by the mitochondria. Overall, our data indicate that the emission arm of trout liver mitochondrial H_2O_2 metabolism is highly responsive to stressors and bioenergetics whereas the consumption arm is resilient.

1:15 pm - The effect of temperature on bacterial fermentation to enhance the drug discovery process

Anna Kuznetsova[1], Brad Haltli[1], Russell Kerr[1]

[1] *Department of Biomedical Sciences, Atlantic Veterinary College, University of Prince Edward Island*

The specific environmental conditions of the ocean, especially its high hydrostatic pressure, wide-ranging temperatures, and oligotrophic conditions have affected marine bacteria in various ways, forcing them to adapt to many different marine environments. Nevertheless, we still do not know much about the genetic mechanisms underlying environmental adaptation. We hypothesize that one of the environmental factors which plays a significant role in bacterial growth and metabolic output is temperature. Previously in our laboratory, it was shown that some marine Streptomyces produce such antibiotics as actinomycin and landomycin in a temperature dependent manner, but we still do not know the molecular mechanism underlying this. The aim of this project is to elucidate the molecular mechanism of the temperature adaptation of marine Streptomyces isolated from Frobisher Bay, Canada. We hypothesize that a novel regulatory mechanism underlies this which can be exploited to access other cryptic natural products and enhance the drug discovery process.

1:30 pm - Chemical elicitation of natural product biosynthesis with surfactant molecules in marine *Streptomyces*

Z. Maw [1], B. Haltli [1,2], R. Kerr [1,2,3]

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[2]Nautilus Bioscience, part of Croda International Plc, Charlottetown, PEI
[3]Department of Chemistry, University of Prince Edward Island, Charlottetown, PEI

Microbes are the best chemists known to man, capable of making some of the most unique and complicated bioactive natural products known. In marine environments, some of the most diverse microbial communities can be found in sponges and soft corals. Isolating bacteria from these habitats has allowed us to accumulate a rich genetic diversity of some of the most prolific natural product producing bacteria, the *Streptomyces*. The *Streptomyces* genus is known to produce over 70% of all discovered antibiotic molecules. Genome sequencing of the model strains of *Streptomyces* has highlighted that this genus is often capable of making far more natural products that it readily produces in the laboratory, highlighting the great potential for our diverse collection to provide many more natural products than initially theorized. Natural products not produced under standard lab conditions are termed "silent". A method to induce such silent biosynthetic gene clusters is using a chemical elicitor. In this research, we explore the use of surfactant molecules as tools to stimulate new natural product biosynthesis. Using modern tools of metabolomics, induced natural products are tentatively identified and unknown molecules are purified. This research will give insight into the effectiveness of using the surfactant molecules as a tool to find new natural products from silent biosynthetic gene clusters.

1:45 pm - Retrospective Study of Methicillin-Resistant *Staphylococcus pseudintermedius* from Samples Submitted by an Atlantic Veterinary Teaching Hospital

A.E Webster, *J.T McClure, M.E. Saab, J. Stull, M. Evason, J. Sanchez*

Characterization of methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) isolates from samples submitted to the diagnostic laboratory by the Veterinary Teaching Hospital at the Atlantic Veterinary College from 2008 to 2018 was performed. Isolates were considered either resistant or susceptible to 14 non-betalactam antimicrobials. Antimicrobial susceptibility testing was performed using either the disk diffusion or broth microdilution method. Overall temporal trends were assessed and antimicrobial resistance profiles and their associations with host characteristics were determined. Due to the dermatologic nature of MRSP, analysis focused primarily on samples from the ear, skin, wound and surgical sites. A total of 99 MRSP clinical cases during the eleven-year period were observed. The number of MRSP cases ranged from 8 to 53 per month, indicating an overall prevalence of 5.1%, with highest values in 2013 (7.7%), 2014 (5.7%) and 2015 (5.8%). A monthly pattern was also observed, with highest values in April (6.5%). The antimicrobials that MRSP showed high susceptibility to included rifampin (100.00%), amikacin (98.98%), and fusidic acid (95.89%). MRSP demonstrated high resistance to erythromycin (64.36%), pradofloxacin (60.00%), and marbofloxacin (58.46%). Marbofloxacin resistance was significantly associated with sample location *(P= 0.065*), with more than 70% of resistant isolates originating from ear, surgical and wound samples. Erythromycin resistance had a significant association with sex (*P=0.033*), where male dogs were 1.5 times more likely to show resistance than female dogs. Further identification of trends, risk factors, and

antimicrobial resistance of MRSP is essential for identification of patients with a high risk of an MRSP infection and for rational use of antimicrobials within Atlantic Canada.

2:00 pm - Infectivity of spontaneously-shed *Angiostrongylus vasorum* and *Crenosoma vulpis* L3 to dogs

William T. Robbins[1], Spencer J. Greenwood[1], Laura Rogers[3], Gary A. Conboy[2]

Department of Biomedical Sciences, Atlantic Veterinary College, University of Prince Edward Island
Department of Pathology and Microbiology, Atlantic Veterinary College, University of Prince Edward
Animal Health Division, Department of Fisheries and Land Resources, St. John's, NL., A1E 3Y5

Metastrongyloid respiratory parasites, *Angiostrongylus vasorum* and *Crenosoma vulpis* are important pathogens to dogs. Recent studies indicate gastropod intermediate hosts infected with metastrongyloids spontaneously shed third-stage larvae (L3). Shed L3 retain motility up to 120 days but whether they retain infectivity remains unknown. To assess infectivity of shed L3, the heart/lungs of 6 red fox (*Vulpes vulpes*) were obtained and examined for first-stage larvae (L1) by Baermann technique. A high number of viable *A. vasorum* L1 and a small number of *C. vulpis* L1 were recovered; these were used to infect naïve *Limax maximus*. L3 recovered by artificial digestion were fed to two research beagles (100 L3/dog). The L1 shed by these dogs were used to infect 546 *L. maximus*. Recovered L3 from the slugs were aliquoted on romaine lettuce in 6-well tissue culture plates and kept at 16^{o} C/75% RH. Four research beagles were then exposed to L3 stored for 0, 2, 4 or 8 weeks after shedding. All dogs began shedding *C. vulpis* L1 26-36 days post-infection (PI). All dogs began shedding *A. vasorum* L1 by 50 days PI. Infectivity of L3 was retained in both metastrongyloids indicating exposure through environmental contamination may occur in natural infection in dogs.

2:15 pm - Serologic and urinary survey of exposure to leptospirosis in a feral cat population of Prince Edward Island

Emilia Bourassi [1], Christine Savidge[2], Peter Foley[3], Sunny Hartwig[4]

1,2,3 Department of Companion Animals, Atlantic Veterinary College, Charlottetown, PEI
4 Department of Biomedical Sciences, Atlantic Veterinary College, Charlottetown, PEI

Leptospirosis is considered an emerging disease in humans and dogs in North America. Cats with outdoor lifestyles may be in close contact with potential reservoir hosts and could play a role in transmission or act as sentinels. Recent studies show that seroprevalence in cats is not negligible and naturally infected cats can shed DNA from pathogenic *Leptospira* species in urine. There are few reports of leptospirosis on Prince Edward Island and none in cats.

The objective of this study was to determine the prevalence of serum antibodies against *Leptospira* species and of Leptospira DNA in urine of a population of free roaming cats.

Paired blood and urine samples from 200 cats were analyzed. Antibody titers against six *Leptospira* serovars (Bratislava, Canicola, Gryppotyphosa, Hardjo, Pomona, Icterohaemorrhagiae*)* were determined by microscopic agglutination test. Polymerase Chain Reaction (PCR) was performed on urine samples to identify urine shedding of *Leptospira* DNA. Antibodies were detected in 20/200 cats (10%) for at least 1 serovar with titers ranging from 1:50 to 1:6400. Urine samples of 5/200 cats (2. 5%) were PCR-positive.

Outdoor cats in Prince Edward Island have higher than expected exposure to leptospirosis and can shed DNA from pathogenic *Leptospira* species in urine.

2:30 pm - Using a Microbial Domestication Pod (MD Pod) for the Discovery of Novel Marine Natural Products

Emily Pope1, Tartela Alkayyali4, Bradley Haltli1,3, Ali Ahmadi4 and Russell Kerr1-3

1Department of Biomedical Sciences, University of Prince Edward Island, PE, Canada.
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4Department of Sustainable Design Engineering, University of Prince Edward Island, PE, Canada.

Marine natural products produced by microbes represent an indispensable resource for various biotechnological applications, including use as medicines, dietary supplements, personal care products and diagnostic agents. However, the discovery of novel natural products is hindered by the fact that only approximately 1% of microbes are currently culturable under traditional laboratory practices as described by the 'Great Plate Count Anomaly.' While various advancements have improved cultivability, the ability to culture "unculturable" microbes remains limited as existing techniques do not facilitate interspecies cellular communication while maintaining high throughput cultivation. To overcome these limitations, we developed a new in-situ microbial growth chamber, termed the microbial domestication pod (MD Pod). The MD Pod uses microfluidics to encapsulate bacteria within agarose microbeads resulting in high-throughput cultivation and isolation while allowing cellular communication and transmission of chemical signals. To prove its effectiveness, the abundance and diversity of microbes cultured using the MD Pod was compared to those cultured using traditional plating methods. Based upon colony counts, cell viability, and microbial diversity as assessed using denaturing gradient gel electrophoresis (DGGE) and 16s gene sequencing, it is expected that using the MD Pod will result in the culture of a greater diversity of microbes.

2:45 pm - A novel α-methylated *N*-acyl amino acid of microbial origin: structure elucidation, SAR and biosynthetic study

Logan W. MacIntyre[1], Marie J. Charles[2], Bradley A. Haltli[1,3], Douglas H. Marchbank[3,4], Noelle J. Duncan[3] and Russell G. Kerr[1,3,4]

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A novel antibacterial natural product, *N*-palmitoyl-α,*O*-dimethyl-L-tyrosine (1), from the marine sponge-associated bacterium *Alteromonas* sp. RKMC-009 will be discussed. Compound 1 was purified from large-scale fermentations of RKMC-009 using flash chromatography and its full 3D chemical structure was elucidated using a combination of nuclear magnetic resonance (NMR) spectroscopy (1D and 2D methods) and chemical derivatization. Compound 1 possesses an unprecedented α-methyl substituent that we postulated was responsible for its antibacterial activity against Gram-positive bacterial pathogens. Three structural analogues of 1 differing in their methyl substitution patterns were chemically synthesized and assayed in parallel with 1 against two *Staphylococcus* spp. and six *Enterococcus* spp. A structure-activity relationship (SAR) was uncovered: the presence of an α-methyl is necessary for the activity of 1 against *Staphylococcus* spp. and it confers significantly greater potency against *Enterococcus* spp. Finally, our

efforts to elucidate the biosynthetic origin of this structurally unique and bioactive natural product will be discussed.

3:00 pm - Natural Product Discovery from Marine Actinomycetes

Libang Liang[1], Brad Haltli[2,3], Douglas H. Marchbank[1,3], Hebelin Correa[3], Russell G. Kerr[1,2,3]

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More than seventy percent of clinically important antibiotics were isolated from actinomycetes, mainly from terrestrial sources; however, marine actinomycetes are an under-studied resource representing an immense reservoir for natural product discovery. Fermentations of seven actinomycetes using a heat-killed "inducer" strategy were analyzed by LC-MS based metabolomics. The strategy involves supplementing autoclaved "inducer" cultures to the fermentations of "producer" actinomycetes. Metabolomics analysis of the marine *Streptomyces* sp. RKBH-B178 fermentations led to identification of a new biotransformation product PQS-GlcA, and an up-regulatioin of a new natural product that we have named hydrazidomycin D. Further natural product screening resulted in the identification of an unprecedented new PK-NRP hybrid compound RKLL631 produced by the marine strain *Streptomyces* sp. RKND-216. The compound has an IC_{50} value of 1.34 µM against *Mycobacterium tuberculosis*. The biosynthetic gene cluster of the compound was identified and confirmed by gene knockout experiments.

May 17th

9:15 am - Analysis of structural proteins of Atlantic salmon bafinivirus, a coronavirus of fish

Ashley Mckibbon 1, Fredrick S. Kibenge 1, Molly Kibenge 1

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Atlantic Salmon Bafinivirus (ASBV) is a recently discovered fish coronavirus, isolated from farmed Atlantic salmon. The ASBV genome, similarly to other bafiniviruses, has 4 major open reading frames (ORFs): replicase polyprotein (pp1a/1b), spike (S), membrane (M), and nucleocapsid (N) proteins. Genome sequence analysis of ASBV revealed a putative sixth protein, a 110 amino-acid polypeptide, which most likely corresponds to the envelope (E) protein in coronaviruses of the subfamily *Coronavirinae*. The primary aims of this research are characterize the replication kinetics of ASBV, to determine the location of the receptor-binding domain in the S1 subunit of the S glycoprotein, and to determine if the 110 amino-acid polypeptide is transcribed during virus replication. These *in-vitro* studies will advance our understanding of coronaviruses in fish.

9:30 am - Can Functional Feeds Modulate the Direct and Indirect impacts of *Lepeophtheirus salmonis* and Infectious Salmon Anemia virus co-infection in the skin of Atlantic salmon (*Salmo salar*)?

Dylan Michaud[1], Tyson Hay[1], Sara L. Purcell[1], Shona K. Whyte[1], Laura Carvalho[1], Nellie Gagne[2], Richard G. Taylor[3], Matthew L. Rise[4] and Mark D. Fast[1]

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Lepeophtheirus salmonis is an ectoparasitic copepod which parasitize both wild and farmed salmonids. Infections cause major economic losses to the salmonid aquaculture industries by negatively impacting variables such as feed conversion and growth rates which result in decreased quality of the final product. Infectious Salmon Anemia virus (ISAv) similarly results in significant economic losses due to early harvests and mass mortalities on outbreak sites. As netpen environments often reflect multiple pathogen challenges and subsequent infections, such as those from *L. salmonis* and ISAv, development and screening function feeds for protection against co-infection involving major salmonid pathogens is essential for improving fish health and reducing industry losses. The present study aimed to evaluate four novel diets under the conditions of single (lice only) and co-infections (lice and ISAv). Overall lice abundance was significantly lower in feeds with 1% EPA/DHA compared to feeds containing 0.3% EPA/DHA at the end of the trial, however this did not result in enhanced survival under co-infection. Additionally qPCR was used to explore host response and pathogen virulence directly at the host-parasite interface. Skin samples at the site of louse attachment as well as an adjacent site were analysed for host gene response to viral (ie. IFNγ, ISG/IRF, etc.) and/or parasitic (ie. MMP9/13, IL-10) infections as well as parasite virulence factors in the same attachment sites in response to the host. The characterization of protection-associated biomarkers from this work will be important for better understanding of the host-parasite dynamic and in development, screening and refinement of future functional feeds which are needed to enhance fish health under co-exposure conditions of the sea cage.

9:45 am - Lepeophtheirus salmonis and Moritella viscosa Co-infection in Atlantic Salmon (Salmo salar)

Kathleen S. Parrish[1], Sara L. Purcell[1], Shona K. Whyte[1], Anthony J. Manning[2], Richard G. Taylor[3], Matthew L. Rise[4], Mark D. Fast[1].

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Memorial University of Newfoundland, Canada

Many pathogens co-exist in the marine environment, and as such co-infection is an important factor in disease management of aquatic animals. Currently, there are no published studies on Lepeophtheirus salmonis and Moritella viscosa co-infection in Atlantic salmon. In the current study, Atlantic salmon (40 fish per tank, 4 tanks per treatment) were exposed to either or both pathogens and fed either commercial or experimental feeds. L. salmonis abundance was recorded for all fish, and during sampling events C (26-34 days post L. salmonis infection) and D (40-46 days post L. salmonis infection) the M. viscosa then L. salmonis infected group had significantly higher mean lice counts as compared to all other L. salmonis infected groups (P-Value < 0.05). Kaplan Meier survival analysis determined the probability of survival was higher in the L. salmonis-only group, as compared to all other infected groups. The M. viscosa-only group had a higher probability of survival than the L. salmonis then M. viscosa infected group. The order of co-infection may impact L. salmonis counts and the survival rate of infected fish. Further analysis will be

done to identify differentially expressed biomarkers of co-infection, to aid in the development of treatments tailored to a co-infection scenario.

10:00 am - Fisheries management in a changing climate – insights from the Northwest Atlantic lobster fishery

Marlene Mulligan

Northwest Atlantic coastal and island communities have been founded on and flourished from their fisheries since the earliest records of human history and they stand to be impacted disproportionality by threats to the surrounding marine territory. Unlike other current day fisheries, the lobster fishery in this region is experiencing abundance. Catch rates and spawning stock biomass have been steadily increasing for over three decades due to the loss of predators, increase in waters temperature and management strategies. The increase in landings and value of the lobster fishery is widely viewed as a rare fisheries success story. However, the lack of economic diversity in the fisheries coupled with rising ocean temperatures and acidification hints at the potential for an economic disaster. In this presentation I provide an overview of scholarly literature on climate and biological science relating to the future of lobster in Atlantic Canada and lay out a case for concern. Then I analyse the formal and informal governance regimes in the lobster fisheries in the Northwest Atlantic for insight into specific management choices that have played a role in sustaining the fishery. Conclusions will be useful for lobster fishery policies and management – formal and informal.

10:15 am – Investigating Sea lice Infestation at Multiple Atlantic Salmon Farms in Bay of Fundy, New Brunswick

M.I. Parent[1], H. Stryhn[1], L. Hammell[1], R. Vanderstichel[1]

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Salmon lice are a serious pest to the Atlantic salmon aquaculture industry. Although a wide range of models to describe salmon sea lice infestation have been developed around the world, there are no such models for the Bay of Fundy. This area is home to over 40 active salmon farms and represents an important economic contributor to Atlantic Canada. We develop a model to examine the role of management and environmental drivers on salmon lice infestation pressure. One of the key variables within the model is a measure of connectivity useful to describe how salmon lice from neighbouring farms interact. Unfortunately, it is difficult to capture field information on how sea lice travel, reproduce and attach to salmon. We adapt the measure of connectivity by examining sea lice travel distances. We experiment with seaway distances from 5 to 60 km to evaluate if the salmon lice make up one or multiple populations. The seaway distance that fits best in the model of adult female salmon lice abundance will represent the connectivity. Previous research has shown that salmon lice may travel up to 30 km which suggests that salmon lice in this area are likely made up of a single population.

10:30 am - Population Genomics and Reproductive Migration Behaviour of Atlantic salmon in Prince Edward Island

C.M. Grove[1,2], S.D. Roloson[1,2], S.A. Pavey[1,3], M.R. van den Heuvel[1,2]
[1]Canadian Rivers Institute, [2]University of Prince Edward Island, [3]University of New Brunswich

Atlantic salmon are a species of concern worldwide; therefore, it is important to understand their genetic diversity and the fitness implications of that diversity. A unique genotype of Atlantic salmon within the Gulf of St. Lawrence was recently identified at two locations on Prince Edward Island (PEI), Canada. This may represent the original genetics on PEI prior to extensive stocking from other locations within the Gulf. In order to characterize the full geographic extent of this genotype, microsatellites were used in order to analyse all twenty Atlantic salmon stream populations on PEI. Fin clips were taken from juvenile salmon and DNA extracted followed by various preparatory steps for Illumina Next Generation Sequencing. Genetic analysis was combined with a study of the reproductive migration of adult salmon using PIT tags in one of the distinct populations. Adult salmon were tagged and monitored using five antenna arrays in North Lake, plus two arrays in adjacent watersheds. Although, straying between adjacent streams did not occur, a lot of movement within North Lake was evident. Residence time was also longer than anticipated with fish staying a couple months after suspected spawning. Combining these studies will allow for better conservation and management of these populations.

11:00 am - Satisfaction with Education Agents: A Study on International Students in Canada

Han Xu, Master of Education candidate, Faculty of Education, UPEI

The international student market is one of the many manifestations of academic capitalism in higher educational institutions (HEIs) (Kauppinen, Mathies, & Weimer, 2014). It is multiplying and attracts more players to share the profit, among which is the education agent. An education agent is a for-profit third party that helps international students with their application (Roy, 2017). Agent practice is common in many countries, including the U.K., U.S., Australia, and Canada. However, voice of concern is raising as goal conflict and information asymmetry among the students, agents, and HEIs, the lack of transparency in the agreements, and the absence of a governing body or guidelines allowed for unethical practices. The high number of international students and the widespread agent practice in Canadian HEIs entail a need for researchers to look at this issue in the Canadian context. This study is set to survey international students in Canada for valuable insights. Strong support from the Atlantic region is expected. Correlation analysis will be implemented between students' demographic characteristics and their preference/experience with education agents. Open-ended items will enable the author to do in-depth analysis and hopefully lay the foundation for future larger scale research.

11:15 am - Gender Dynamics in the Creative Writing Classroom: The Lived Experience of Female MFA Graduates

Kate Roberts Bucca, Faculty of Education, UPEI

The majority of master of fine arts programs in writing operate through a workshop model, in which a group of writers and a writer-professor meet to discuss the writing of the participants. Each student must remain silent while his or her piece is being discussed by the other members of the group, a practice known as "muzzling." During workshop, I noticed that male students, though proportionally fewer, voiced their opinions more frequently and more assertively than their female peers, setting the tone for discussion and often dismissing female characters as "unlikeable" or "unbelievable." The importance of representation in literature is paramount, as literature helps to create and reproduce the meanings associated with gender. Employing a poststructural feminist lens, my research will involve narrative interviews with female graduates of MFA programs in order to learn how these writers have internalized or pushed back against the perspectives of their male peers and professors, and how they view their lived experience in workshop as having affected their portrayal of female characters in their writing. With a better understanding of how

gender dynamics affect women's writing, we may be able to tweak the current system of writing instruction to make it more inclusive.

11:30 am - Out of the Box: Queerying Identity Development for Sexual and Gender Minority Youth in Prince Edward Island

Dr. Brittany A. E. Jakubiec, Faculty of Education, UPEI

In this research study, I set out to answer two research questions, (a) "How do sexual and gender minority (SGM) youth in Prince Edward Island understand their gender and sexual identities during mid-adolescence?" and, (b) "How does identifying as an SGM youth impact their day-to-day experiences in their schools, communities, and families?" I performed a qualitative case study using two research methods, interviews and journaling, to find out more about four SGM youth, Avery, Finn, Isabelle, and Mikey. This study is not retrospective. Participants in this study are youth who are presently undergoing identity formation and trying to understand their SGM identities. The participant case studies present the experiences and understandings of youth coming to understand their gender identities and sexualities. The findings reveal that identity formation and development is not a linear process, not easily fitting into the traditional milestone or stage models. In reality, the identity formation process for sexual and gender minority youth is complex, and sometimes there is no discernable end-point where identity labels are settled upon. The cases show, in part, the complexities of queer identity formation, exploration, and development during mid-adolescence. The participant cases show the impact that their identities have had on their family relationships, their schooling experiences, their mental health, and for some, the navigation of the healthcare system.

11:45 am – Teacher's Experiences Creating and Delivering Indigenous Curricula on Prince Edward Island in Response to the Truth and Reconciliation Commission's Recommendations

Lomeharshan Lall, Faculty of Education, Master of Education, University of Prince Edward Island

This thesis endeavoured to gain insight into how the Truth and Reconciliation Commission's (TRC) recommendation regarding curriculum development is being implemented in the Prince Edward Island (PEI) Education System. Many non-Indigenous educators have struggled to respond to the TRC recommendation by creating and teaching curricula with Indigenous content. This research, therefore, collected and analyzed the experiences of teachers who are making efforts to create and deliver Indigenous content in their classrooms using semi-structured interviews. With a focus on teachers working in junior high schools on PEI, the research found that if teachers are to create and deliver Indigenous curricula, they must develop a strong conceptual framework which include becoming more familiar with Indigenous culture, understanding what it means to be an Indigenous ally and using their privileges to give voice to those who do not have a space to be heard. It is vital to teach content from an Indigenous perspective and employ a diversity of teaching styles. Teachers experienced both systemic and classroom based challenges which include not having a mandated curriculum and not knowing how to integrate Indigenous content into the current curriculum. The thesis recommends creating a mandated provincial Indigenous curriculum and creating an Indigenous Learning Centre.

12:00 pm - The Impact of Workplace Violence Prevention Training: A Critical Appraisal

Tobia Wiedemer

Workplace violence is an issue that concerns many people and stakeholders. A common method used by organizations to prevent workplace violence is workplace violence prevention training. This research employs the critically appraised topic (CAT) method to examine what is known in the scientific literature on the impact of workplace violence prevention training on workplace violence. My review of thirteen studies shows that findings in this literature are mixed as many studies have found that training leads to fewer assaults, yet some highlight that training can also lead to an increase in the trained individuals' frequency of dealing with assaults. This critical appraisal identifies many variables that can moderate and mediate the effect of workplace violence prevention training on workplace violence, including the location of the organization, level of knowledge of policies and reporting structures, and industry. While my systematic search and review of this literature did not find a clear answer as to the effectiveness of workplace violence prevention training, it provides helpful recommendations for future exploration and implications for practice.