Thank you and fantastic work to everyone who presented at last week's FST Research Day!

BIOBEAT

April 12, 2021

Congratulations, we made it!

Welcome to the final BioBeat of the year! We can all say that we've accomplished something that no one in history has - survived a year of online learning during a pandemic! We aren't finished with it yet, of course, but hopefully we're all feeling a little more optimistic now than we were a year ago. It's been an extraordinary year for both faculty and students but hopefully, there was more good than bad. We recognize how difficult this was and thank you for being patient with your profs too. We are all here because we're excited to teach you and I think this story that our wonderful lab instructor, Margot Williams shared with me last week sums it up nicely.

"OMGoodness - the sweetest thing just happened. I went to my last lecture and everyone had their cameras on (!) and I told them how wonderful it was to see all their faces and they said, "Hold on we have something for you," and they all had made signs saying "Thank You" which they then held up for me to see! And they all said "Thank you for a wonderful semester". It was soooooo sweet! Just made my whole semester. :-)"

To send you on your way, here are some parting messages from us to all of you:

First year, final year, and every year in between: I'm so proud of you. After more than a year of remote learning, I know you can adapt, persist, and succeed. You've got this! I look forward to welcoming you back to campus soon, hopefully in the Fall! - **Jonathan Withey, Dean of the Faculty of Science and Technology**

What do you call an academically successful slice of bread? An honour roll. (I figured we could all use a laugh after this year! Well done everyone!). - **Cheryl Melatdoost, Academic Advisor**

The 2020-21 academic year has been quite a challenge. You should feel good about accepting and meeting that challenge! - **Tracy O'Connor**

This year you have been forced to adapt how you learn, but your adaptability will be a strong asset down the road. - **Mike Asmussen**

Well done for making it through a difficult year. In addition to traditional learning, I hope that you learned some new skills and gained independence. Looking forward to seeing you on campus next Fall! - **Sarah Orton**

You survived an academic year during a pandemic! Take care of yourselves, and focus on the unique skills you've learned by necessity! - **Trevor Day**

Thank you students for all your hard work this term...I know it hasn't been easy. Just a little joke to leave you with...Why don't ants get sick? Because they have little anty bodies. Ha ha! - **Lydia Chiasson**

Why don't ants get sick? Because they have antybodies! Wishing everyone an antibody-filled summer and a return to the classroom in September! - **Nicole Welch** (Physiology jokes are so good, we get that one twice!)

It's spring. Take up birding as a hobby. Trust me on this one! - **Dorothy Hill**

You did it! We did it! I'm very proud of all of you for the grit you've shown to get here - April 2021. Remember your success in the face of this year's unique challenges. - **Nick Strzalkowski**

I am so impressed that anyone was able to make it through a semester (let alone a year) of online university during a pandemic. This is not what I ever hoped my job as an educator would be, and it's probably not what you envisioned when you thought about going to university. Congratulations, and all the best! - **Jon Mee**

ONE REASON TO TAKE UP BIRDING THIS SUMMER

Shrikes are so cool! They are a perching bird (passerine), like the robins and chickadees in our backyards, but they have evolved to become a predator. How do you eat your prey when you have perching bird feet instead of the sharp talons hawks and owls use to tear off pieces of meat? Shrikes have this morbid behaviour of impaling their prey (small rodents and large grasshoppers) on the thorns of buffalo thornberry bushes and, more recently, barbed wire. They are listed as Threatened in Canada: it would be such a shame to let a cool bird like this go extinct! – Dorothy Hill

Loggerhead Shrike in Grasslands National Park. Photo by Dorothy Hill

Congratulations on finishing up this year. It wouldn't have been possible without your flexibility, dedication to school work, and persistence in a year unlike any other. Take time for yourself during the break and we can't wait to see faces again! - **Melanie Rathburn, Associate Dean, Academic**

You experienced a once in a century situation and rose to meet that challenge. While the community of MRU supported you in your journey, it is ultimately your feet that will carry you on your path forwards. Great work and bright futures ahead. - **Adrienne Benediktsson**

Histology/life never looks the way it does in a textbook, but it's still beautiful. Congratulations on all you've achieved at MRU. - **Carol Armstrong**

Thank you all for your patience and perseverance while we muddled through one difficult year!
- **David Bird, Associate Dean, Research**

Congratulations, Class of 2021! The steps you have taken in the past have been essential for your success in life. Now, you are at the beginning of a new and exciting journey. Be open-minded, set your goals, and make them happen! Best wishes for your bright future! - **Tatiana Rogasevskaia**

"At long last, it's a wrap. "Virtually" no more! You can survive anything after surviving this academic year, Bravo! " - **Kartika Tjandra**

Thanks for reading this newsletter, for all of your hard work, and the lessons you taught us this year too. This year might not have been ideal but at least it was memorable! - **Sarah Hewitt, Interim Chair Biology (and BioBeat writer!)**

APRIL 19 – INDEPENDENT STUDENT PROJECT FINAL PRESENTATIONS

Join us on April 19th as the students doing Independent Project courses give their final presentations. Come support your fellow students!

Madison Isenor: Why You Should Care About Your Migrating Motor Complex What do shrews, dogs and humans have in common? The migrating motor complex (MMC)!
The MMC is a cyclic, contractile, motility pattern that occurs while we are fasting. Referred to as the 'housekeeper of the gastrointestinal tract,' it sweeps undigested debris and microbes towards the colon. In my project I am researching the MMC and its effect on digestion. If you've never heard of the MMC before, check out my presentation about this fascinating and understudied function of our gastrointestinal tract.

Neldimar Kham: Determining Single Nucleotide Polymorphisms between Argenteum and Wildtype plants in Pisum sativum Argenteum is a phenotypic trait found in mutant pea plants belonging to the Pi343333 plant line. The trait is signified by the leaves of the plant turning silver-grey green, as well as the epidermis of the leaves being less adhered to the underlying cell layer. The exact genomic location of the mutation in argenteum plants has yet to be determined. In this study, Single Nucleotide Polymorphisms (SNPs) within transcribed regions of DNA are identified between argenteum and wild-type plants. This study will help lead to future studies to determine the genetic locus of the argenteum trait.

Give yourself some downtime this summer. You've earned it.

Melanie Koey: Broad Pathogenic Potential in Streptococcus pneumoniae: A Need to Reassess Vaccination Strategies Against Pneumococcal Disease For most, pneumonia doesn't seem dangerous – there are treatments and vaccines! However, the microbes that cause pneumonia are still killing millions of people each year. My project focuses on factors that allow these bacteria to cause disease and how they can relate to prevention strategies. I found that several factors contributed to disease, yet current vaccines only target one of these factors. This project emphasizes the variation and potential danger within this bacterial species and suggests candidates for improved vaccination.

Kathy Le: Mobility-Related Assistive Technologies as a Cost-Effective Alternative to Improve Gait Impairments in Individuals with Multiple Sclerosis You know the pins and needles sensation after your leg "fell asleep"? Well, persons with multiple sclerosis (pwMS) experience the same feeling, but all over their body. This loss of sensation can become so debilitating that they may lose their ability to walk. To keep their disease from progressing, these individuals pay for costly drugs that have undesirable side effects. My research focuses on whether mobility-related assistive technologies are a cost-effective solution to maintain the ability to walk in pwMS.

Daniel Major: Mutagenesis of surface-exposed tryptophan residues in leaderless bacteriocin lacticin Q What do we do when we suspect a specific amino acid might be important to an antimicrobial peptide's mechanism of action? We mutate it of course! Using a spicy combination of molecular and microbiological techniques, we generated a series of plasmids encoded with a gene for a mutated antimicrobial peptide. In the future, we (or maybe you?!) can transform these plasmids into bacterial protein-making factories and test how these mutant antimicrobials function fighting other bacteria.

Tony Marullo: Cerebrovascular Responses During Voluntary Breath Holding are Larger than Rebreathing Individuals with obstructive sleep apnea stop breathing intermittently. When you're not breathing, there's no gas exchange between the lungs and the environment, causing blood levels of carbon dioxide to rise and oxygen levels to drop. When this happens, blood pressure increases and

more blood flows to the brain as the sympathetic nervous system triggers a fight-or-flight response. We compared how both breath-holding and rebreathing similar gases affect these increases to better understand stroke risk in obstructive sleep apnea.

Ryan Owchar: A proposal to provoke postural perturbations through electrical vestibular stimulation
Have you ever thought that an electric shock to the head would ever be beneficial? It could be for those who suffer from vestibular disorders. These disorders cause a loss of control of standing balance, and a technique called electrical vestibular stimulation is being tested as a treatment. The technology needs to be improved however, and that is why we are looking at a new prototype device capable of delivering electrical vestibular stimulation much more easily than traditional methods.

Emily Pedersen: The impacts of urban anthropogenic noise on animal behaviour Have you ever been in a really loud bar, trying to have a conversation with someone but you can't hear a thing they're saying? Well, it turns out that this is what many urban animals experience when trying to talk to one another! One

What are you most looking forward to this summer? Whatever it is, make plans to do it. And enjoy it. Oh, and get outside.

APRIL 19TH TALK SCHEDULE

commonly ignored change in urban environments is noise pollution. Understanding the adverse impacts of noise on an animals' behaviour allows us to see how well some are able to adapt, and how others are unable to cope with changes in their environment.

Emily Yap: Genetic basis of dorsal spine polymorphism in Brook stickleback (Culaea inconstans) populations in Alberta Did you know that our local brook sticklebacks have varying numbers of dorsal spines? Some may have 5 while others have 6, but why is that so? Predation is thought to be the ecological cause of dorsal spine polymorphism in brook stickleback, but the genetic basis of it remains unknown. In this project, I aim to discover the loci responsible for dorsal spines in Alberta's brook stickleback population with a GWAS study. The findings of this project will also contribute to our understanding of parallelism and genetic constraint in the evolution of adaptive traits.

TALK SCHEDULE (WITH LINKS)

Session 1: 9:30-11:30AM

Presentation 1: 9:30-9:55am - Anthony Marullo - Cerebrovascular Responses During Voluntary Breath Holding are Larger than Rebreathing

Presentation 2: 10:00-10:25am - Daniel Major - Mutagenesis of surface-exposed tryptophan residues in leaderless bacteriocin lacticin Q

Presentation 3: 10:30-10:55am - Madison Isenor - Why You Should Care About Your Migrating Motor Complex

Presentation 4: 11:00-11:25am - Ryan Owchar – A proposal to provoke postural perturbations through electrical vestibular stimulation

Session 2 - 12:30pm to 2:00 pm

Presentation 1: 12:30-12:55pm - Emily Pedersen - The impacts of urban anthropogenic noise on animal behaviour

Presentation 2: 1:00-1:25pm - Kathy Le - Mobility-Related Assistive Technologies as a Cost-Effective Alternative to Improve Gait Impairments in Individuals with Multiple Sclerosis

Presentation 3: 1:30-1:55pm- Melanie Koey - Broad Pathogenic Potential in Streptococcus pneumoniae: A Need to Reassess Vaccination Strategies Against Pneumococcal Disease

Session 3 - 2:30pm to 4:00 pm

Presentation 1: 2:30-2:55pm - Emily Yap - Genetic basis of dorsal spine polymorphism in Brook stickleback (Culaea inconstans) populations in Alberta

Presentation 2: 3:00-3:25pm - Michael Makhoul - TBA

Presentation 3: 3:30-3:55pm - Neldimar Khamvongsa - Determining Single Nucleotide Polymorphisms between Argenteum and Wildtype plants in Pisum sativum

That's it, everyone. Thanks for a weird but wonderful year. Congratulations to our graduating class! Everyone else, see you next year...