

16th Annual OCIB Symposium Abstract List

Oral Presentations: Animal Behaviour and Ecology

10:00 LI YUN

Graduate student with Dr. Howard Rundle (University of Ottawa)

“The effect of mating environment on the evolution of male harm”

One fitness consequence of sexual interaction is a depression of female fitness due to "male exposure" - a.k.a. male harm. Recent work shows that the scope for male harm is much reduced when adults interact in different mating environments. Here we present the results of a *Drosophila melanogaster* evolution experiment involving 63 replicate populations in different mating environments, we found the evolution of male harm depends on the evolutionary history of populations, and the mating environments in which males and females interact.

10:20 LAUREN EFFORD

Graduate student with Dr. Tom Sherratt (Carleton University)

“Learning to make a binary food choice with *Gryllus assimilis*”

Here, we investigated the ability of Jamaican field crickets *Gryllus assimilis*, to learn a binary food preference between a palatable and unpalatable novel prey item. A total of 33 adult crickets underwent 8 consecutive days of experimental observations, consisting of 2 days of acclimatization followed by 5 days of testing. Overall our results suggest that adult Jamaican field crickets are capable of learning a binary food preference. We highlight the influence of visual and olfactory discriminatory signals, and the role of innate predispositions associated with aposematism on our results.

10:40 KARL LOEFFLER-HENRY

Graduate student with Dr. Tom Sherratt (Carleton University)

“The evolution of flash displays and other hidden signals as an antipredation mechanism”

Flash behavior, in which otherwise cryptic prey exhibit conspicuous coloration or noise when fleeing from potential predators, has been postulated to hinder location of prey once they become stationary. We tested the efficacy of flash displays as an anti-predation mechanism using a custom built computer game and human participants. Our results demonstrate first proof of concept: flash behavior, widely seen in taxa from insects to mammals, is an effective anti-predator escape mechanism.

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11:00 CARL POSSÉME

Graduate student with Dr. Steven Cooke (Carleton University)

“The impacts of boat noise on a prey species: the bluegill sunfish *Lepomis macrochirus*”

This is a pre-experiment presentation. We will look at the impacts of 2-stroke and 4-stroke motor noise on the behaviour of a common North American fish: the bluegill sunfish. Two different experiments will be made: (1) a Flight Initiation Distance experiment using a predator model and (2) an exploratory behaviour experiment using a Z-maze.

11:20 IAN DEWAN

Graduate student with Dr. Tom Sherratt (Carleton University)

“Run Away!: The adaptive advantage of being startled”

Startle, or deimatic, signals are used by a variety of species as a defence against predation by causing predators to delay or abandon an attack on a prey item. One possible reason for the effectiveness of these signals is that to a predator it is ambiguous whether the signal comes from suitable prey or a danger, such as a disguised ambush predator. We develop a mathematical model of predator decision-making as a multi-step signal detection problem, and examine in which circumstances immediate abandonment is a superior strategy to further examining a potential prey item.

Oral Presentations: Genetics and Physiology

10:00 LIAM EATON

Graduate student with Dr. Matthew Pamenter (University of Ottawa)

“Reactive Oxygen Species and Nitric Oxide during Acute Hypoxia in Cortical Neurons of Naked Mole Rats”

Reactive oxygen species (ROS) and nitric oxide (NO) contribute to neuronal death during hypoxia/reoxygenation. We hypothesized that ROS and NO production in hypoxia-tolerant naked mole rat cortical neurons is minimal during hypoxia/reoxygenation. We found that ROS was unchanged during hypoxia/reoxygenation, whereas NO decreased reversibly during hypoxia. These findings suggest that naked mole rats may be adapted to attenuate increased ROS production in hypoxia and reoxygenation as a result of living in a naturally intermittent hypoxic environment.

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10:20 MUSTAFA HAMID

Graduate student with Dr. Marie-Andrée Akimenko (University of Ottawa)

“Complementary contributions of transcription factors during zebrafish pectoral fin development”

The m-Inta11 enhancer is active in pectoral fin cells that express *hoxa13a*, *hoxa13b*, and *hoxd13a* transcription factors. Using a transgenic approach, we report a complementary pattern between m-Inta11 positive cells and cells expressing the *fli1a* transcription factor. This pattern correlates with changes in cell behavior, tissue reorganization, and blood vessel remodeling during embryonic and larval development. Using ectopic expression analysis, we propose a new role for *fli1a* and *hox13*, and provide further evidence for a regulatory relationship between *fli1a* and *hox13* during fin development.

10:40 AAKRITI GUPTA

Graduate student with Dr. Kenneth Storey (Carleton University)

“OCT4 triggers a NRF2-mediated antioxidant response in anoxia-tolerant frogs”

Wood frogs tolerate winter by freezing 70% of their total body water and endure anoxia/dehydration. Episodes of stress/recovery lead to ROS production which damages cellular macromolecules & initiates destructive pathways. Transcription factors activate gene expression for antioxidant enzymes. OCT play roles in embryonic development & adult tissue. NRF2 & OCT4 regulate the expression of antioxidant and detoxifying enzymes & play an important role in endurance of stress conditions. Expression study of OCT4 & NRF2 & their downstream factors showed significant changes in tissue specific manner.

11:00 LORRIE BOISVERT

Graduate student with Dr. Paul White (University of Ottawa)

“Tackling ToxTracker data: developing a data analysis pipeline to facilitate genotoxicity screening”

The ToxTracker assay detects genotoxicity in mouse embryonic stem cells by simultaneously monitoring fluorescent biomarkers linked to six reporter genes. It generates large amounts of complex, multivariate dose-response data, creating a need to devise appropriate data processing techniques that facilitate rapid and effective interpretation of assay results. This study contributed to the continuing development of robust data analysis pipelines to facilitate and effective interpretation of ToxTracker dose-response data for routine regulatory screening.

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11:20 HANANE HADJ-MOUSSA

Graduate student with Dr. Kenneth Storey (Carleton University)

“Genes of the undead: Hibernators and zombies display different gene expression profiles”

Post-mortem transcriptome studies have identified zombie genes that come alive after death. We hypothesized that hibernation, the closest natural mammalian phenomenon to death, would display a similar gene profile. Available transcriptomic resources and qPCR of 7 torpid tissues of 13-lined ground squirrels showed little in common with post-mortem genes. Hibernators repress transcription and survive only on transcripts required for metabolic rate depression and do not require zombie genes, the cell's last resort during stress. This is the first study to explore zombie genes in a living system.

Oral Presentations: Agriculture and Microbiology

14:30 TIAH LEE

Graduate student with Dr. Cory Harris (University of Ottawa)

“Metabolomics comparison of vaporized cannabis flower and oils”

Cannabis contains many phytochemicals and recognized mainly for the presence of cannabinoids. Vaporization is a method of ingestion that can extract chemicals of cannabis with heated gas. In this study, a metabolomic approach was applied to compare the phytochemicals of different strains of dry cannabis flowers and oils to their corresponding vapor extracts. It was seen that vaporization can alter cannabis chemistry leading to different phytochemical profiles in cannabis extracts in both dry flower and oils.

14:50 AMANDA CARROLL

Graduate student with Dr. Alex Wong (Carleton University)

“Plasmid-Host Interactions in Antibiotic Resistant *E. coli*”

Antimicrobial resistant (AMR) plasmids can have various effects on the fitness of their *E. coli* hosts, and these effects can change over the course of negative selection. In this study I tested 46 clinically relevant host-plasmid combinations and found variable fitness effects depending on the combination. Further, costly strains could reduce their cost over a short period of negative selection, and certain compensatory mutations may cause this. These data suggest plasmids can persist in certain cases and contribute to problems in treating AMR infections.

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15:10 THOMAS WITTE

Graduate student with Dr. Myron Smith (Carleton University)

“New molecules produced during vegetative incompatibility in the chestnut blight fungus”

Vegetative incompatibility (VI) is an immune-like response to hyphal fusion between conspecific strains of filamentous fungi which differ at any vic locus, resulting in cell death. Using liquid chromatography coupled to high resolution mass spectrometry, we compared metabolomes of monocultures and mixed VI cultures of *Cryphonectria parasitica*, the chestnut tree blight. MS signals statistically significant to VI were annotated and purified for NMR structural elucidation where possible. One new compound was then linked to a biosynthetic gene cluster significant in VI-associated transcriptomes.

15:30 BABUR JAHID

Graduate student with Dr. Bahram Samanfar (Carleton University)

“Identification of differentially-expressed genes responsible for protein content in soybeans”

I will be talking about my work at Agriculture Canada in regards to identifying genes that are responsible for the seed protein content in soybean lines grown across eastern and western Canada.

15:50 GHAZALEH NOURPARVAR

Graduate student with Dr. Myron Smith (Carleton University)

“Escape from het-6 incompatibility in *N. crassa*”

Nonself recognition in filamentous fungi is by heterokaryon incompatibility proteins. *N. crassa* strains carrying the incompatible factors un-24PA and het-6OR show aberrant growth. After 4.5 days, wild-type sectors emerge from un-24PA-het-6OR colonies through “escape”. Escape is due to point mutations arise in het-6 (94%) or vib-1 (3%, incompatibility suppresser) or unknown factors result in a feathery morphology (3%). We introgressed each of 80 gene mutations into un-24PA-het-6OR strain and results show deletions of the DNA damage checkpoint factors either suppress or delay escape.

16:10 DANIEL BURNSIDE

Graduate student with Dr. Ashkan Golshani (Carleton University)

“Designing synthetic binding proteins from random amino acid sequences”

Synthetic proteins that can bind a target with high affinity can be used for a variety of purposes, but few tools are available to design such proteins. The In-Silico Protein Synthesizer (InSiPS) was developed to design novel proteins that bind pre-determined targets while minimizing off-target interactions. As a proof of concept, we target three yeast proteins and demonstrate binding and inhibition of two of three targets. This robust approach furthers the emerging field of de novo protein design and offers several advantages over the limited number of techniques currently available.

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Oral Presentations: Human Health

14:30 JOSHUA IVARE

Graduate student with Dr. Marie-Andrée Akimenko (University of Ottawa)

“Characterization of Zebrafish *lrrc56* Mutants to Model a Rare Human Genetic Disease”

Motile cilia are microtubule extensions from cells that create cerebrospinal fluid flow and play a role in determining left-right (L/R) asymmetry of visceral organs by moving extracellular fluid. At CHEO, geneticists identified fetuses with a homozygous missense variant of the *LRR56* gene presenting with mirror image placement of internal organs and complex cardiac anomalies symptomatic of a ciliopathy. We show that zebrafish *lrrc56* is important for proper cerebrospinal fluid flow and L/R-asymmetry, therefore verifying that the observed phenotypes of the fetuses are due to the *LRR56* mutation.

14:50 ZACHARY DWYER

Graduate student with Dr. Shawn Hayley (Carleton University)

“Leucine rich repeat kinase-2 (*LRRK2*) modulates microglial phenotype and neurodegeneration”

Will be presenting a series of three related experiments (2 mouse model, 1 cell culture) currently being prepared for submission. The presentation will address the role of *LRRK2* in neurodegeneration and Parkinson's disease, the acute mechanisms linked to the gene and finally demonstrate that the *WAVE2* protein is an important target for *LRRK2* in the microglia in the context of an environmental stressor.

15:10 ALEXIA KIRBY

Graduate student with Dr. Adam Shuhendler (University of Ottawa)

“Mapping aldehydes as bio-markers of disease using Positron Emission Tomography”

An increase in endogenous aldehyde production often underlies the early stages of many pathologies, including atherosclerosis, drug toxicity, and traumatic brain injury. While aldehydes are an attractive biomarker for the early molecular events leading to disease, their *in vivo* detection by imaging has not yet been fully realized. We have developed a radiotracer ($[^{18}\text{F}]\text{NA3BF3}$) that binds aldehydes, allowing for imaging of aldehydes by positron emission tomography (PET). Following *in vivo* validation, we can now apply $[^{18}\text{F}]\text{NA3BF3}$ to the diagnosis and treatment of a wide range of diseases.

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15:30 TASNIA SHARIN

Graduate student with Dr. Laurie Chan and Dr. Jason O'Brien (University of Ottawa)

“Screening Bisphenol A Replacements: Cytotoxicity and mRNA Expression in Chicken Embryo Hepatocytes”

Due to concerns about its endocrine disrupting properties, bisphenol A (BPA) is being replaced with structural analogs. But little is known about the toxicity of these new compounds. Here, preliminary toxicological screening of five BPA replacements was conducted in primary chicken embryo hepatocytes. Comparisons to BPA were made based on cytotoxicity and mRNA expression. All replacements induced comparable cytotoxicity to BPA, and dysregulated genes in multiple biological pathways. These results suggest the replacements have comparable toxicity to BPA, but may act via different mechanisms.

15:50 YEN TRAN

Graduate student with Dr. Carole Yauk (Carleton University)

“In silico genotoxicity screening: so which compounds are DNA-damaging?”

A vast number of chemicals are present in the Canadian environment and have not been tested for toxicity. Genotoxicity (i.e., DNA damage) assessment is imperative to reduce risk of genetic diseases and cancer. The study leveraged *in silico* QSAR tools to screen a large list of compounds for genotoxicity. This presentation demonstrates how QSAR were applied to predict genotoxic hazards, advise testing conditions, and recommend priority compounds that should be subjected to further scrutiny. Such findings were shared with regulatory scientists to support chemicals management at Health Canada.

16:10 KATIE NOAH

Graduate student with Dr. Alex Wong (Carleton University)

“GWAS of *P. aeruginosa* in cystic fibrosis patients”

Pseudomonas aeruginosa is an opportunistic bacterium that chronically infects the lungs of patients with cystic fibrosis. We know these bacteria evolve within the lung environment, and have an idea of some of the changes that occur. This study's aim is to discover new genes and mutations that could contribute to the survival of *P. aeruginosa* in the CF lung. We use novel GWAS methods to do so, and compare these results with current methods.

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Poster Presentations

1. Mabrouka Bugaldian (University of Ottawa)

“Validation of a questionnaire to assess feeding and gastrointestinal (GI) problems in Rett syndrome”

Rett syndrome is a neurological condition affecting 1 in 10,000 females. Rett syndrome patients suffer several gastrointestinal dysfunctions resulting in constipation, poor feeding, and gastroesophageal reflux. The association between feeding and gastrointestinal problems remains unclear. To assess this association, the feasibility of a questionnaire as a tool will be pilot tested on a group of patients. This questionnaire will assess methods of nutrient intake and feeding, major GI symptoms associated with feeding, and the caregiver's major concerns about feeding and overall satisfaction.

2. Kevin Xiong (Carleton University)

“The role of clade III TGA factors in BLADE-ON-PETIOLE-dependent regulation of plant development”

BLADE-ON-PETIOLE1/2 (BOP1/2) genes play important roles in plant defense and development. Loss-of-function *bop1 bop2* mutations disrupt meristem boundaries resulting in fused organs and the loss of floral organ abscission. BOP1/2 interact with TGA transcription factors to bind to DNA. Clade V and clade I TGAs have been found to function in BOP-dependent regulation of plant development. However, little is known about the function of clade III TGAs (TGA3 and TGA7). My project explores a potential role for clade III TGA transcription factors in BOP-dependent regulation of plant development.

3. Will Jarvis (University of Ottawa)

“How do genetic correlations constrain evolution?”

Natural selection often acts on many traits at once, but correlations between traits obstruct our ability to predict evolution. I am proposing to employ a recently developed quantitative genetic framework that combines estimates of divergent selection and genetic correlations to gain insight into adaptive divergence between allopatric and sympatric populations of the N. American mushroom-feeding fly *Drosophila subquinaria*. This study will fill gaps in our knowledge of how genetic correlations influence multivariate trait evolution, and ultimately aid our ability to predict evolution.

4. Chris Angell (University of Ottawa)

“Natural perfume: How do antler flies choose their mates?”

The epicuticular compounds (ECs) of insects prevent desiccation and act as pheromones for various social interactions, including mate choice. However, most studies of their role in mate choice have been performed in the lab. Here we identify the major ECs of the antler fly and quantify their role in male mating success in the wild across two years. Variation in male ECs was associated with mating success, although different combinations of traits were favoured in each year. We further reveal selection on ECs to be significant via female choice but not male-male competition.

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5. **Khang Hua (University of Ottawa)**

“Molecular changes during dopaminergic neuron regeneration in adult zebrafish”

Parkinson’s Disease (PD) is a progressive and debilitating neurodegenerative disease associated with a loss of dopaminergic (DA) neurons within the midbrain. The study of molecular mechanisms regulating neuronal regeneration in species that can regenerate cells of the CNS could provide potential novel therapeutic targets for PD. Therefore, we aim to elucidate the molecular changes that occur during neuronal regeneration in response to cell specific ablation of DA neurons in adult zebrafish. We observed an upregulation in shh and notch signalling in response to cell ablation.

6. **Bidemi Keshinro (University of Ottawa)**

“Structural analysis to deduce actinodin role during zebrafish fin development”

In teleosts, actinodin (and) genes encode proteins integral to the formation of rigid fibrils which provide structural support to the developing fins. The C-terminal domain of And1 proteins contain 8- 10 conserved repeats that we hypothesize are essential for its structure and function. Zebrafish expressing truncated and1 marked with fluorescence are being created to determine if these repeats are necessary for the formation of actinotrichia. These experiments aim to build an understanding of the role these repeats play in supporting the developing fin.

7. **Thuong Tran Nguyen (Carleton University)**

“Assessment of migratory bird density and stopover habitat quality using autonomous technologies”

Autonomous and non-invasive technologies can monitor stopover density of migratory songbirds and assess stopover habitat quality. I aim to evaluate whether Canadian Weather Surveillance Radars reliably show the on-ground variation in density of autumn, nocturnal migrants, and whether this density is related to landscape composition. If so, at what spatial scale? The study of stopover sites provides insight into the mechanisms causing changes in migratory bird populations, which can then be used to identify important stopover sites for conservation.

8. **Anand Chopra (Carleton University)**

“Protein quantification via UV-dependent reaction of 2,2,2-trichloroethanol with aromatic residues”

We have developed a novel microplate-format protein quantification assay based on the UV-dependent reaction of 2,2,2-trichloroethanol (TCE) with protein residues. We demonstrated that UV irradiation induces the reaction of TCE with both tryptophan and tyrosine residues, yielding products with fluorescent properties that extend into the visible range. In comparison to absorbance at 280 nm assays, another tryptophan-based quantification method, our TCE-assay displays superior linearity and sensitivity within the same quantification range.

9. **Ariane Rondot (University of Ottawa)**

“Mobilization of energy reserves during bumblebee queens overwintering period”

My research investigates the stored fuel used during overwintering in bumblebee queens. Using cellular respirometry, I determined the metabolic capacity of the muscle cells of queens to use various fuels and

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if this capacity changes throughout the overwintering period. I also measured body composition to determine how the various energy stores (lipid, glycogen, protein) change during hibernation. Overall, this work clarifies how bees manage energy stores during overwintering.

10. Michael Kalyn (University of Ottawa)

“Investigating locomotor defects in a neurotoxin-induced Parkinson’s Disease zebrafish model”

Clinical hallmarks of Parkinson’s (PD) are motor movement symptoms associated with a progressive and irreversible loss of dopaminergic (DA) neurons within the substantia nigra. Our aim is to develop a PD model in adult zebrafish. Here we use ICV injections for efficient delivery of MPTP, a neurotoxin known to induce PD-like symptoms. The loss of DA cells observed following ICV injections is shown to be linked to a locomotor defective phenotype in the treated zebrafish. This strategy will provide a novel platform for neurotoxin-induced Parkinsonism, while ameliorating vertebrate models for PD.

11. Reeham Kadhom (University of Ottawa)

“Characterization of actinodin1 and actinodin2 loss-of-function zebrafish mutants”

Actinotrichia are rigid fibrils that support embryonic fin development. They are composed of actinodin, encoded by the actinodin (and) genes. The and genes are not found in tetrapods thus their loss is believed to have contributed to limb evolution. Previous research has demonstrated that a transient knockdown of and1 and and2 results in fin defects in zebrafish larvae. With a double gene knockout, we show that there are defects in the pectoral and caudal fins of larvae and adult zebrafish. This helps further elucidate the impact of the loss of the and genes in the context of limb evolution.

12. Rayanna Merhi (Carleton University)

“Long-term metabolic consequences of chronic TCDD exposure during pregnancy”

Diabetes is a global health issue that affects millions. Pollutants, such as dioxins (TCDD) have been correlated to type 2 diabetes incidence. We hypothesized that exposure to TCDD during pregnancy will impair pancreas adaptation in dams and lead to long-term deficits in glucose metabolism. To test this, female mice were treated with TCDD or vehicle throughout pregnancy and lactation, and then challenged with a high fat diet (HFD). Upon HFD introduction, TCDD-exposed dams rapidly developed hyperglycemia and dysregulated insulin secretion, suggesting a causal link between dioxin and diabetes.

13. Rhyanna Melanson (University of Ottawa)

“Undergraduate science students’ research attitudes influence on future intentions for research usage”

Informed by the institutional goals of enhancing the student learning experience and research, this study seeks to describe the relationships between undergraduate science students’ intention to use their research competencies in their future professional practice and their perceptions of and attitudes towards research, their research context and activities.

14. Kenny Huynh (University of Ottawa)

“Absence of plasticity in skeletal muscle mitochondrial functions following acute in vivo hypoxia”

Naked mole rats (NMRs) are among the most hypoxia tolerant mammals and likely experience severe hypoxia underground. Supporting muscle function in hypoxia is challenging because reduced O₂

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compromises aerobic mitochondrial energy production. Therefore, we hypothesized NMR muscle mitochondria would 1) exhibit functional plasticity following acute in vivo hypoxia to enhance energy production efficiency, and 2) support an increased reliance on carbohydrate fuel substrates in hypoxia. Surprisingly, we found no effect of in vivo hypoxic acclimation with either carbohydrate or lipid substrates.

15. Melody Gavel (Carleton University)

“Impact of neonicotinoid pesticides on amphibian immune systems and susceptibility to parasites”

Amphibians are facing global population declines, some of which is due to exposure to pesticides and emerging diseases. Neonicotinoids are frequently used pesticides which account for over 25% of global insecticide sales and are commonly found in waterways used by amphibians. However, these pesticides may have negative impacts on non-target organisms. My research looks at what impact these insecticides have on amphibian immune systems, and their susceptibility to parasites. My research will help to ascertain the safety of these pesticides to amphibians, and inform conservation strategies.

16. Samantha Torne (University of Ottawa)

“Developmental changes of microglia morphology in naked mole rats (*Heterocephalus glaber*)”

Naked mole rats, NMRs, are the most hypoxia-tolerant mammal and have an exceptionally long lifespan. Research supports that retention of neotenic traits into adulthood may underlie both of these characteristics. Microglia are immune cells of the brain, and exhibit morphological changes with development. We hypothesized that adult NMR microglia retain a neotenic morphology into adulthood. To test this, we used immunohistochemistry to examine microglia in the brains of 1, 6, and 36 month-old NMRs. Our results allowed us to make morphological comparisons at these distinct developmental stages.

17. Aaron Shifman (University of Ottawa)

“The mechanisms of ultra-high precision in an oscillatory neural circuit”

Timing in neural circuits is critical for many applications such as sound localization and learning. The pacemaker network (PN) of some electric fish sets the timing of an electric organ discharge (EOD) used in electric sensing. The PN is the most precise biological oscillator known, with sub-microsecond timing variation. The level of connectivity between neurons in the PN is insufficient to provide the population averaging required for the measured precision. In order to study this phenomenon we have developed a model of PN neurons that matches experimental recordings and manipulations.

18. Ruben Martinez (University of Ottawa)

“Applying omic techniques to unravel distinct pathways of PFOS toxicity in zebrafish eleutheroembryos”

The aim of our study was to identify molecular footprints of the exposure to PFOS (perfluorooctanesulfonate; a fluorosurfactant considered as a POP and EDC) in early zebrafish development at transcriptomic, metabolomic and morphometric levels. Transcriptomic and metabolomic analysis of 5 dpf embryos exposed to PFOS (0.03-1.0 mg/L) from 2 to 5 dpf showed disruption in lipid transport and metabolism, immune system, apoptosis and cell-cell interaction pathways. Regarding morphometrics, PFOS (0.1-7.5 mg/L) had a specific effect on body length, head-trunk angle and scoliosis presence in the larvae.

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19. John Tunnell (University of Ottawa)

“Nitrogenous waste handling and oxygen consumption in amphibious fish *Polypterus senegalus*”

Polypterus senegalus is a basal ray finned fish that may serve as a marker for the evolution of water organisms to land. Considering this several adaptations would have to take place for these fish to survive land exposure. Fish were put through respirometry trials to measure oxygen consumption rate and then white muscle and liver tissue were dissected to measure ammonia and urea levels to test how these fish handle nitrogenous waste in air exposure. Through this experimental design the hypothesis that they change their metabolic rate and or they store ammonia in specific tissues was tested.

20. Rojaalsadat Mousavi (University of Ottawa)

“Screening of GABA-producing bacteria isolated from commercial starter cultures”

Commensal bacteria produce a variety of neurotransmitters such as gamma-aminobutyric acid (GABA) which, beyond interacting with intestinal physiology, can transit through neural pathways linking the enteric and central nervous systems and influence brain functioning. Lactic acid bacteria (LAB) are an important source for glutamate decarboxylase, enzyme converting L-glutamate to GABA, and thus can be regarded as promising GABA-producing candidates with psychobiotic effects.

21. Anna Ananchenko (University of Ottawa)

“Identification of antigens for the development of a subunit vaccine against *A. baumannii*”

Acinetobacter baumannii is an extensively drug resistant bacterium for which new therapies are urgently needed. To identify candidate antigens for a subunit vaccine, two strains of *A. baumannii* were used to immunize mice via two different routes of vaccination. Using serological proteome analysis (SERPA), immune sera were compared and immunoreactive proteins were identified by nanoLC/MS/MS. When correlated with biological data, these identified proteins can be further investigated as candidates for a potential subunit vaccine against *A. baumannii*.

22. Tina Haiyi Wang (University of Ottawa)

“Reactive nitrogen species production during reperfusion in the naked mole rat brain”

Reperfusion following hypoxia induces neuronal damage, partially due to the unregulated production of reactive nitrogen species (RNS). We hypothesized that cortical neurons from hypoxia-tolerant naked mole rats would generate less RNS relative to hypoxia-intolerant mice. We quantified nitric oxide (NO) production in brain slices during normoxia, hypoxia (<1% O₂) and reperfusion. We found that NO production decreased in hypoxia and returned to normoxic levels following reperfusion, suggesting a possible neuroprotective adaptation mechanism in naked mole rat brain.

23. Emiliyan Staykov (University of Ottawa)

“Validation of histone deacetylase inhibitors for the treatment of Type 1 Myotonic Dystrophy”

With a prevalence of approximately 1 in 8000 among Caucasian populations, type 1 myotonic dystrophy (DM1) is the most common adult muscular dystrophy in the world. Previously unstudied for DM1 treatment, our lab has identified histone deacetylase inhibitors (HDACis) as a promising class of therapeutics. Using an approach that involves high throughput screening followed by secondary

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validation in DM1 myoblasts, we have shown that HDACis are capable of greatly reducing the amount of the disease-causing transcript (DMPK), while also correcting DM1-mediated mRNA mis-splicing.

24. Hailey Quigley (University of Ottawa)

“Got Joints? Role of 5’ *hoxa/d* genes in development and regeneration of joints in the zebrafish fins”

Zebrafish possess the ability to regenerate their fins. Zebrafish fins contain segmented bony fin rays that span the fin. Fibrous joints are at regularly spaced intervals providing flexibility for the fin. Our lab has shown that new joint formation correlates with the upregulation of *hoxa13a*. To further examine the function of the 5’ *hoxa/d* genes in zebrafish, our lab created CRISPR-Cas9 mutations that inactivate *hoxa13a*, *hoxa13b*, and *hoxd13a*. With further analyses our lab proposes that the dosage of *hox* alleles is responsible for anomalies in joint formation found in *hox* mutants.

25. Mike Sadowski (Carleton University)

“A functional genomics approach for the identification of a candidate gene for the E8 maturity locus in soybean (*Glycine max*)”

No abstract provided.

26. Mira Rasran (University of Ottawa)

“Impacts of acquired traumatic brain injury (aTBI) on the auditory system”

The objective of the study is to highlight the impacts of acquired traumatic brain injury (aTBI) on the integrity of the auditory system. This retrospective observational study used data obtained from a hearing clinic, where results of Audiology battery tests and peripheral audiological assessments of patients diagnosed with aTBI were collected. Our results confirm that aTBI affects the auditory system negatively. This suggests the importance of including audiological assessments post-aTBI to reduce hearing defects as much as possible, in order to improve the quality of life of patients.

27. Jonathan Mack (University of Ottawa)

“Revision, taxonomy and phylogeny of the Hyphomyceteous genus *Hormomyces*”

The fungal genus *Hormomyces* is revised using specimens collected in Canada and USA and herbarium specimens. Fresh specimens were cultured and sequenced using the ITS locus and LSU gene. Based on morphological and molecular characters, the genus *Hormomyces* was found to be monotypic and nested in the genus *Tulasnella*. Therefore, the new combination *Tulasnella aurantiaca* is proposed. The phylogenetic analyse for both ITS and LSU loci are presented, and a brief discussion on the possible ecological niche and relationship with other *Tulasnella* is presented.

28. Maryam Hajikarimlou (Carleton University)

“Lithium chloride toxicity is connected to regulation of gene expression in yeast”

Lithium Chloride (LiCl) has been used as an effective treatment option for bipolar disorder (BD) for decades. Consequently, its toxicity, mode of action and cellular responses have been the subject of investigations over the past decades. LiCl is shown to influence signaling and signaling transduction pathways, specifically pathways involving protein kinase C and glycogen synthesis kinase-3. Additional effects of LiCl at the molecular level, including its side effects require further investigations. In yeast, LiCl

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treatment is reported to reduce the activity and expression of *PGM2*, a gene that encodes a phosphoglucomutase involved in sugar metabolism. In the current study we identify two understudied genes, *YTA6* and *YPR096C* that when deleted increase cell sensitivity to LiCl treatment in yeast. We further show that *YTA6* and *YPR096C* exert their activities by influencing the expression of *PGM2*.

29. Gurjit Singh (Carleton University)

“Mondo A: A key regulator of sugar-induced gene expression in frozen wood frogs *Rana sylvatica*”

Mondo A is a glucose responsive transcription factor, that interacts with MLX to induce the expression of several downstream targets in response to the rise in glucose levels. This transcription factor plays a role in insulin resistance and is deemed as a target to prevent type-2 diabetes in preclinical trials. This study investigates the effects of freezing on the regulation of the Mondo A-induced transcriptional network in the wood frogs.

30. Sara Takaloo (Carleton University)

“Identification and investigation of novel in translation associated genes in yeast”

No abstract provided

31. Tianqi Jiang (University of Ottawa)

“Essential effect of neuropeptidergic signaling on interval timing of male *Drosophila*”

Interval timing is an organism’s subjective experience to perceive the duration of an indefinite event. Previous studies have found that SIFamide is a neuropeptide governing courtship, sleep, and feeding among many insect species. Knockdown of SIFaReceptors have found to be affecting LMD and SMD; SIFaR-RNAi screening via GAL80/ GAL4 inhibition mechanism is thus performed to determine subpopulation of SIFaR expressing neurons that mediate LMD and SMD. Four neuropeptides were tested: Drosulfakinin (DSK), Eclosion hormone (EH), Myosuppressin (MS), and Proctolin (Proc).

32. Odera Ekeh (University of Ottawa)

“The extent of unhealthy food and beverage sponsorship of children’s sports clubs in Ottawa”

Food and beverage marketing has been identified as a determinant of childhood obesity. Sponsorship is a marketing technique used by the food industry to target children when they are engaged in sports and it is linked to obesity. In Canada, no research has evaluated children’s exposure to sponsorship in these contexts nor has any assessed the healthfulness of the products advertised through sponsorship. Based on my research findings, it can be supported that policymakers in Canada should be aware of these promotional strategies in order to lower the risk of childhood obesity in Canada.

33. Kenan Touma (University of Ottawa)

“Role of the somatotrophic axis in the metabolic phenotypes of dominant and subordinate fish”

In this project, my goal was to use juvenile rainbow trout (*Oncorhynchus mykiss*) to determine whether the GH-IGF axis is differentially regulated at the gene expression and protein level between subordinate and dominant rainbow trout. It is well-known that social hierarchies in fish can affect metabolism and growth traits, exemplified by reduced feeding and stunted somatic growth in subordinates. I

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hypothesize that these changes in metabolism and growth rate are linked to the differential regulation of the GH-IGF axis.

34. Myriam Hoyeck (Carleton University)

“A link between early-life exposure to environmental pollutants and diabetes risk”

Pancreatic β -cells secrete insulin to control glucose homeostasis. The Bruin lab has shown that dioxins, a group of highly persistent organic pollutants, suppress β -cell function and cause β -cell loss in mice. As such, dioxin exposure during periods of β -cell development (i.e. fetal growth) or β -cell adaptation (i.e. pregnancy or high fat diet feeding) may confer a lifetime risk of developing diabetes. This study analyzed the effects of chronic dioxin exposure to dams during pregnancy on pancreas development, metabolism, and long-term diabetes risk in offspring and dams.

35. Yulong Wei (University of Ottawa)

“Coevolution between gene features and translation machinery in bacteria”

Rate of biosynthesis relies on translation initiation and elongation efficiencies. In bacteria, initiation is facilitated by the pairing potential between Shine-Dalgarno sequence and anti-SD sequence in the 16S rRNA; whereas elongation efficiency depends on tRNA-mediated codon bias. To trace how changes in rRNAs and tRNAs influence gene evolution, we use RNA Sequencing data and devised strategies to correctly annotate mature 16S rRNA 3' ends and quantify tRNAs. These analyses enabled us to elucidate optimal SD-aSD pairs and measure coevolution between tRNA availability and codon optimization.

36. Di Peng (University of Ottawa)

“Distribution of secretoneurin in the brain and pituitary of the zebrafish”

Secretoneurin (SN) is a 31-34 amino acid neuropeptide, derived from the proteolytic processing of the precursor protein secretogranin-II (Scg2). Teleosts have two Scg2 proteins named Scg2a and Scg2b that are processed into SNa and SNb, respectively. We have previously demonstrated that exogenous SNa stimulates the release of luteinizing hormone (LH) in vivo and in vitro in goldfish, while mutation of scg2a and scg2b genes leads to decreased lhb and cga subunit mRNA levels in adult zebrafish pituitary. The objective of this study was to determine the distribution of SNa in relation to other known reproductive hormones in zebrafish brain and pituitary by double immunofluorescent staining. SNa-immunoreactivity (ir) was observed in neuronal cell bodies in the ventral telencephalon, preoptic area (POA) and hypothalamus in female brain. Neuronal fibers staining for SNa projecting from the magnocellular POA passed through the pituitary stalk and terminated largely in the neurointermediate lobe (NIL). The SNa-ir fibers were less abundant but clearly present in the pars distalis. Moreover, SNa colocalized with isotocin in cell bodies in the POA and fibers in the NIL. Using the lhb-RFP transgenic zebrafish line, we observed SNa-ir near LH-secreting cells but not in them. Counterstaining nuclei with DAPI revealed that some endocrine cells within the NIL and rostral pars distalis also expressed SNa-ir, but their identity is currently under investigation. In situ hybridization confirmed that magnocellular neurons and cells in the NIL are sites for Scg2a/SNa production. These data indicate that SNa or related peptides produced from Scg2a may affect gonadotrophs through neuroendocrine and paracrine pathways. These observations support our hypothesis that Scg2a/SNa are involved in vertebrate reproductive processes.

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37. Aswen Sriranganathan (University of Ottawa)

“Detecting polyphosphorylation as a post-translational modification in mammalian candidate proteins”

A presentation of the findings of an experiment carried out to detect post-translational modification, polyphosphorylation, in specifically targeted candidate proteins.

38. Fizza Fatima (University of Ottawa)

“SNP characterization of a diverse selection of wheat genomes using a high-density SNP array”

SNP genotyping arrays allow for the study of genomic patterns of diversity and can be used to carry out marker-trait association and haplotype mapping experiments. Recently, numerous genotyping arrays have been developed to characterize genomes of important crops and animals. However, only a handful of such arrays exist for wheat, resulting in a limited number of diversity analysis and association studies. This study aims to use one such wheat-specific high-density SNP array to identify and evaluate genome-wide variations across several genomically and phenotypically distinct wheat species.

39. Alek Tirpan (University of Ottawa)

“Aerial and aquatic visual acuity testing in voluntary mangrove rivulus by optokinetic reflex testing”

Mangrove rivulus is an amphibious fish capable of surviving in aquatic and terrestrial environments. The visual acuity of rivulus across water and air environments has not been quantified. Due to the difference in the refraction of light between air and water, most fishes are short-sighted in terrestrial environments. This project explores the visual acuity of mangrove rivulus comparatively in air and in water by utilizing OKR. This project aims to shed light on the visual abilities of mangrove rivulus and investigates whether they are able to see better in air or water.

40. Jesse Fortier (University of Ottawa)

“Stormwater management facility characteristics impacting pollinator abundance and diversity”

We look at characteristics of Storm water management facilities (SWMF) that impact pollinator communities. We focus on butterflies since they are sensitive to environmental changes and are easily identified. Two questions are addressed, 1 does a higher portion of non-native plants reduce diversity. 2 does mowing the vegetation, reduce diversity. After collecting Plant and butterfly data from 21 SWMF, we determined that the amount of non-native plants does not impact the butterfly community living there. Mowing of vegetation is the best determinant of the butterfly community around the SWMF.

41. Monica Reyes (University of Ottawa)

“Lethal and sublethal toxicity of a hindered phenol on early development of *Silurana tropicalis*”

Endocrine disrupting chemicals (EDCs) have the potential to change the normal hormonal function in an organism. In amphibians, EDCs may affect development, reproduction and survival. Producing toxicological information of these chemicals is the first step to evaluate the effects they may have on the environment and human health. The hindered phenol 4,4'-thiobis(6-t-butyl-m-cresol); CAS 96-69-5, is an antioxidant and stabilizer additive present in many products of common use, e.g., rubber and plastic products. Despite being highly produced and widely used, there is very little toxicological information about this compound. The objective of this study was to determine the lethal and sublethal toxicity of this hindered phenol on the western clawed frog *Silurana (Xenopus) tropicalis* early development. Male

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and female frogs were induced spawning and selected healthy embryos were exposed to determine the concentration range and the 96h lethal concentration following FETAX protocol guidelines evaluating survival, growth and development. Exposure to 0.025, 0.5 and 0.1 mg/l of this hindered phenol affected tadpole growth and was lethal at 0.2 and 0.4 mg/l. Preliminary 96 h lethal concentration for 4,4'-thiobis(6-t-butyl-m-cresol) was 0.075 mg/l. Further studies should evaluate the chronic effects of this compound on *S. tropicalis* development. This is the first toxicity assessment of this hindered phenol in an amphibian and will directly support the third phase of the National Chemical Management Plan (CMP3).

42. Aylin Erman (Carleton University)

“Biochemical adaptations to dehydration in the African clawed frog, *Xenopus laevis*, skeletal muscle”

The African-clawed frog (*Xenopus laevis*) undergoes periodic extreme dehydration, and may lose over 30% of its body water. The biochemical adaptations in its skeletal muscle including relative miRNA, mRNA and protein expression levels in control, medium dehydration (15% body water lost) and high dehydration (30% body water lost) will be investigated. The findings indicate an increase in control of the central dogma, stress resistance, anaerobic respiration, molecules associated with oxygen delivery facilitation, and muscle contractions. The findings show a decrease in muscle growth, regeneration and differentiation. These physiological adaptations allow *X. laevis* to survive extreme dehydration.

43. Chau Nguyen (University of Ottawa)

“Exploring the contribution of heat shock proteins (HSPs) to the hypoxia tolerance of naked mole rats (*Heterocephalus glaber*)”

Hypoxia is a key aspect of many pathologies and can lead to death. Heat shock proteins (HSPs) are cellular chaperones with cytoprotective roles during hypoxia. We hypothesized that HSP expression would increase during acute hypoxia (7% O₂ for 4, 12 or 24 hrs) in the most hypoxia-tolerant mammal - naked mole rats (NMRs). We observed a global reduction of ATP-dependant Hsp70 and Hsp90 expression; whereas, the expression of ATP-independent Hsp27 and Hsp40 remained constant. These results suggest that cytoprotective HSP function in NMRs is superseded by the need to reduce energy demand in hypoxia.

44. Rangin Haji (University of Ottawa)

“Quality of life in patients with thoracic aortic aneurysm”

Much of the current literature in thoracic aortic surgery focused on short- and long-term morbidity and mortality, whereas patient-centered outcomes have not been studied. We aim to compare the quality of life in patients with thoracic aortic aneurysm who underwent surgery to those who did not undergo surgery. This will provide valuable information in this area to guide surgical decision making, particularly in patients with other comorbidities or life-limiting illnesses. The SF-36 questionnaire is a well-validated quality of life measurement tool in health-care. The SF-36 questionnaire was prospectively distributed to 12 patients who underwent thoracic aortic surgery and 23 patients who did not undergo surgery in the Thoracic Aortic Clinic at the University of Ottawa Heart Institute. Patient demographics and characteristics were retrospectively collected from Electronic Medical Records. Categorical variables were compared with chi-square test or Fischer's exact test; Wilcoxon rank-sum test were used to compare each domain and summary scores of SF-36. There is no statistically significant difference between the surgery group vs the no surgery group in baseline characteristics including hypertension,

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diabetes, coronary artery disease, smoking, COPD and cerebrovascular disease. Scores for physical functioning (PF), role limitations due to physical health (RP), and role limitations due to emotional health (RE) decreased significantly at the post-operative stage compared to the pre-operative stage. Conversely, RP and RE improved significantly at the late post-operative stage compared to early post-operative stage. There is no significant difference in physical component scores and mental component scores when comparing patients at the pre-operative to post-operative stage as well as between the early post-operative and late post-operative stage. Patients present with declined QOL in the PF, RP and RE following surgical intervention. While there is remarkable variability in these eight domains when comparing early post-operative QOL and late post-operative QOL, the PCS and MCS did not change after the surgery. Further longitudinal cohort study is required to better assess QOL in thoracic aortic surgery patients.

45. Maiah Devereaux (University of Ottawa)

“Giant Zambian mole rats hypoxic and hypercapnic metabolic, ventilatory and thermoregulatory response”

Subterranean Giant Zambian Mole Rats (GZMR) putatively experience environmental hypoxia and hypercapnia. GZMR were exposed to graded hypoxic (to 5% O₂) and hypercapnic (to 10% CO₂) conditions and metabolic, ventilatory, and thermoregulatory responses were measured. In hypoxia, GZMR displayed progressive metabolic depression while ventilation increased and body temperature decreased slightly. GZMR did not display a blunted hypercapnic response and metabolism and body temperature were unchanged. These results indicate that GZMR do not have a blunted hypoxic or hypercapnic ventilatory response.

46. Konstantin Alexeev (University of Ottawa)

“Reversibility of marrow fat accumulation in a rat model of knee flexion contractures.”

Bone marrow adipose tissue (MAT) accumulation is a natural process associated with aging and prolonged immobilization. In a previous study investigating fat deposition in a rat model of immobility-induced knee contractures, we documented fat accumulation in the epiphysis of tibia. The objective of this research project was to assess reversibility of adipocyte hyperplasia/hypertrophy after remobilization. 80 rat knee joints were immobilized for 1, 2, 4, 8, 16 and 32 weeks and remobilized for different durations. Findings from this study provide insight into reversibility of MAT accumulation.

47. Destina Matrasingh (Carleton University)

“Spontaneous mutation rates and relative fitness of clinical *Escherichia coli* strains”

The ability to cluster strains of the foodborne bacterium, *Escherichia coli*, as part of a single outbreak can be partly attributed to spontaneous mutation rates. Spontaneous mutations arise as a raw mass of adaptive, neutral, and deleterious mutations. In Mutation Accumulation protocol, mutations are free to accumulate over many generations in an unbiased manner, with negligible influence from environmental pressures. In this experiment, mutation accumulation is analysed without being specifically selected for using whole genome sequencing. Here, nine clinically-isolated *E. coli* strains, of serotypes associated with foodborne illness outbreaks and multi-drug resistant infections, have been studied. The observed rate, and relative fitness of spontaneous mutagenesis found among these strains is important for understanding genetic variation within the populations. Based on this information, we can be better prepared to proactively combat the adaptability of problematic bacterial strains.

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48. Natalia Titkova (University of Ottawa)

“The role of the secretogranin II gene in breeding tubercle and tissue regeneration in male zebrafish”

Secretogranin II (SgII) is a precursor to secretoneurin, a neuropeptide involved in many functions including reproduction and angiogenesis. Teleost fish express two SgII genes, *scgIIa* and *scgIIb*. To further explore the effects of secretogranin and the differences between the two genes, this study looked at whether the disruption of SgII genes in *scgIIa*^{-/-}, *scgIIb*^{-/-}, and *scgIIa*^{-/-};*b*^{-/-} mutants would lead to morphological changes in breeding tubercle and tissue regeneration post-amputation in male zebrafish.

49. Daniel Kostyniuk (University of Ottawa)

“Pck-ing up steam: Widening the salmonid gluconeogenic gene duplication trail”

Rainbow trout have undergone teleost specific and salmonid specific whole genome duplications in addition to those experienced by all vertebrates. Of interest are the evolution and regulation of rainbow trout gluconeogenic genes, and indeed recent molecular and gene expression evidence points to a possible contribution of previously uncharacterized gluconeogenic gene paralogues to the rainbow trout long-studied glucose intolerant phenotype. The present study demonstrates the identification of a salmonid specific genome duplication of ancestral mitochondrial *pck2*, we termed *pck2a* and *pck2b*.

50. Devan Scholefield (University of Ottawa)

“Using Regularized Regression to Assess Behaviours Important for Student Success”

In large enrolment courses online platforms supporting teaching and learning enable teaching methods that would not otherwise be possible. In addition to facilitating active learning these online platforms, such as cloud-based student response systems and online quizzing resources, can mine data from student learning behaviours. While companies claim that the data mined from their platforms can provide useful information to inform professors, few studies have explored if the student behaviour data is related to successful performance in a course. The goal of this investigation was to use regularized regression to explore the factors that most contribute to student success in BIO2133 (Genetics) and evaluate whether or not data obtained from active learning platforms such as Echo360, Mastering Genetics, and Blackboard Learn can be used to explain success in the course. The *glmnet*, *dplyr*, *Tidyverse*, *rsample*, *caret* and *ggplot2* R packages were used to perform regularized regression on the data. This test provides analysis of the variables by progressively shrinking coefficients to zero and allows for feature selection of the most important student behaviours. This model indicated 12 student behaviours important for success. Some of the behaviours included were participation (in class), attendance, and scores on certain Mastering Genetics assignments. The results from this analysis will help to inform teaching and learning practices by providing insight to student learning behaviours that are important for student success. This study should also provide a theoretical framework for similar analysis on other courses in any discipline.

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3 Minute Theses

SHRAVAN RAGHU

Graduate student with Dr. Andrew Simons and Dr. Myron Smith (Carleton University)

“Bet-hedging evolution in thermotolerant yeast”

My research focusses on trade-offs associated with the evolution of thermotolerance in *Saccharomyces cerevisiae*. The wild type lab strain S288c was evolved at elevated temperatures and was shown to have increased heat shock tolerance that is dependent on the phase of growth. This heat shock tolerance comes at the cost of slow growth under benign conditions. Bet-hedging is a risk aversion strategy that reduces a genotype’s variance in fitness across environments. I use the trade-off between heat shock tolerance and growth to evolve a bet-hedging trait under fluctuating selection.

MINA NASR-SHARIF

Graduate student with Dr. Allyson MacLean (University of Ottawa)

“Reverse genetic study of plant defence genes to elucidate involvement in mycorrhizal symbiosis”

Plants engage in interactions with countless microorganisms that span a spectrum from pathogenic to mutualistic. Accordingly, mechanisms have evolved to distinguish friend from foe: supporting the development of beneficial symbioses, whilst suppressing the growth of pathogens. Our knowledge of how host plants control and regulate the growth of beneficial symbionts is poor. In this research project, we seek to understand the involvement of plant defence-associated genes in regulating the arbuscular mycorrhizal symbiosis.

RYAN PUSIAK

Graduate student with Dr. Cory Harris (University of Ottawa)

“Anti-inflammatory properties of *C. sativa*”

Cannabis sativa has been widely used as a medicinal and recreational drug. Could cannabis contain compounds that can be useful in treating inflammation? My thesis will be comprised of running a variety of bioassays to answer this question. Moreover, this thesis may explore the interaction of cannabis and its closest relative, hops (*Humulus lupulus*). Hops (the bittering agent found in beer) have similar compounds that are found in cannabis and may also contain anti-inflammatory properties. I’ll cheers to that!

KEEGAN LUTEK

Graduate student with Dr. Emily Standen (University of Ottawa)

“Locomotor control of *Polypterus senegalus* in novel environments”

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Locomotion is the result of central pattern generators, sensory feedback, reflexes and mechanical constraints of the body and the environment. To test the role of mechanical constraint and mechanosensory feedback in locomotion, I recorded kinematics and muscle activation patterns of *Polypterus* in novel environments. This work improves our understanding of the animal locomotor control system and can inform the design of flexible robotic control systems.

KYLE TAPP

Graduate student with Dr. Owen Rowland (Carleton University)

“Lipid barriers protect plants from environmental stress: Development of stress-tolerant crops”

Terrestrial plants contain surface layers that protect them from environmental stress (e.g. drought, soil toxins, insects, pathogens). Suberin is a lipid-based biopolyester found in bark (cork) and other tissues. Within roots, suberin mediates water uptake, ion transport, and gas exchange. Genes coding for enzymes involved in suberin production (such as transcription factors that up-regulate the activity of suberin genes during development and stress) can be targeted through genetic engineering approaches, in order to develop stress tolerance crops for more sustainable agriculture.

JESSICA GAUDET

Graduate student with Dr. Alexandre Poulain (University of Ottawa)

“Ethanol production by yeast fermentation of lactose”

The Canadian dairy industry is dealing with the problematic waste treatment of a by-product containing high lactose concentrations: milk permeate. This milk permeate has too high of a biological oxygen demand to be released without treatment, which is a cost to the dairy industry. Yeast fermentation was used to transform this by-product into ethanol, that is now profitable, either as ethanol for human consumption (i.e., Vodka) or as a biofuel. In this study, we aimed at optimizing this process by using a yeast strain grown under different experimental conditions.

SUE ZHANG

Graduate student with Dr. Vance Trudeau (University of Ottawa)

“Silence of the frogs”

No abstract provided.

RYAN COLLINS

Graduate student with Dr. Kyle Biggar (Carleton University)

“The expanding role of lysine methylation: discovering new methyllysine substrates for MLL4”

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Lysine methylation is a post-translational modification that until recently has remained relatively unexplored. It has since become clear that lysine methylation is a critical process playing a major role in many cell signalling pathways. MLL4 is a lysine methylating enzyme that has only one known substrate: a histone protein. We have identified two non-histone proteins as new substrates for MLL4, expanding both the known methyllysine substrate-enzyme network and our broader understanding of the role lysine methylation plays in the cell.

DR. HEMANTA ADKHIKARY

Postdoctoral Fellow with Dr. Kyle Biggar (University of Ottawa)

“Systematic development of novel peptide derived therapeutics against cancer”

Systemic chemotherapy is the only treatment option for majority of the cancers. However, cancer cells can eventually become resistant to the treatment. Recently, it has been discovered that methylation can play an important role in tumourigenesis. Similarly, the enzymes that control the methylation state of other proteins are among the most frequently dysregulated genes in human cancers. We have utilized complementary peptide array-based methods of inhibitor development to efficiently design potential inhibitors that disrupt the function of critical proteins known to be drivers of cancer.

DR. JENNY BRUIN

Professor (Carleton University)

“Exploring the link between environmental pollutants and diabetes”

No abstract provided.

DR. MARINA CVETKOVSKA

Professor (University of Ottawa)

“Thriving under ice: the aberrant heat shock response in the Antarctic alga *Chlamydomonas* sp. UWO241”

The green alga *Chlamydomonas* sp. UWO241 is a cold extremophile adapted to life below the surface of the ice-covered Lake Bonney, Antarctica. In its natural environment, UWO241 thrives under permanently low but stable temperatures of 4°C, but in laboratory conditions it exhibits the highest growth rates at 15°C. Using global metabolomic and transcriptomic analysis, we show that despite slow growth rates, algae grown at 4°C are more resistant to heat stress at 24°C. This work challenges the notion that the maximal growth rate in microorganisms indicates the optimal physiological cell conditions.

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DR. HEATHER KHAROUBA

Professor (University of Ottawa)

No title or abstract provided.