ABSTRACT GUIDELINES: *For publication of the Proceedings of the Office of Science of Education (OSE)'s McGill Undergraduate Science Showcase.*

PURPOSE: An abstract should tell the story of your article or research (published, or unpublished). It is a short, succinct, and informative summary of the background, method, results, limitations, and conclusion(s) of your research. It gathers key points and communicates the essential "takeaways" of your research in a condensed manner. The format can change depending on your field of research.

FORMAT

- *Length*: 150-250 words.
- *Font*: Times New Roman (12), single-spaced. Font and type size will be standardized for publication.
- *Acronyms:* All acronyms should be spelled out explicitly the first time they are used (e.g. "magnetic resonance imaging (MRI)". Avoid using too many acronyms.
- *Numbers:* Spell out numbers under 10, and use numerals for 10 and above (e.g., "five participants", "15 samples"). Always use numerals for measurements, statistics, percentages, times, and ages.
- *Do not include tables, figures, or graphs in your abstract.*
- *Do not include references or citations in your abstract.*

TITLE AND AUTHORS

Title: Your title should clearly and concisely explain the content of your abstract. The length of your title should not exceed 40 words or 225 characters. Avoid the use of abbreviations in your title.

Authors: List the names of your co-authors ordered by the magnitude of contribution. The last name in the author list should be the name of your supervisor/principal investigator.

Affiliations: List affiliations (e.g. Department, Institution, City, Province/State, Country) in the order in which they appear in the author list.

KEYWORDS (4-6)

Use standard terminology from your field's databases/thesaurus, avoid abbreviations unless universally recognized in your field, and include one methodology term if novel or central to your research. The keywords should be in alphabetical order and separated by semicolons.

ABSTRACT

Background: Frame the research context and its significance, identify the knowledge gap or problem being addressed. State the main objective clearly and directly state the main hypothesis.

Methods: Describe the basic design of the study as well as its conditions, techniques, procedures, sample size, participant demographics, key measurements, outcomes or any other information relevant to understanding how your results were obtained (software packages, mathematical frameworks, algorithms, and/or validation methods).

Results: Provide data for the key measurements, if applicable. Where appropriate, provide results of statistical tests.

Limitations: Identify the limitations of your study, methodological or otherwise.

Conclusion: Briefly summarise the most significant findings of your research, their interpretation and their significance. Specify if these are preliminary results, and provide directions for future research.

See sample abstracts below.

Sample Abstracts (taken from previous MSURJ issues)

Title: Elevated Ambient Carbon Dioxide Levels Induce Attraction but Not Attachment of Adult Ixodes scapularis in Artificial Membrane Feeding
Authors: Elizabeth Breitbach [1], Victor Lail [1]
Affiliations: [1] Department of Chemical Engineering, University of Minnesota Duluth, Duluth, MN, USA
Keywords: Artificial Membrane Feeding; Attachment Rate; Attractant; Ixodes scapularis; Membrane Contact
Abstract: Numerous feeding studies on tick species have explored disease transmission, vector interactions, and acaricide testing. Traditionally, these studies used animals for feeding. However, artificial membrane feeding offers several advantages including increased standardization of experiments, decreased costs, and improved animal welfare. In vitro conditions must closely mimic natural environments to promote successful feeding attachment. Kairomones produced by the host are strong stimulants that encourage attachment. An important kairomone detected by ticks is carbon dioxide (CO2). Previous studies have shown elevated CO2 levels stimulate host identification and attraction and potentially improve artificial feeding rates in some tick species. The objective of this study was to use an artificial membrane feeding chamber prototype to explore the effects of ambient CO2 in inducing Ixodes scapularis attachment. Differences in attachment rate were explored at an air-typical ambient CO2 level of 0.04% and an elevated CO2 level of 4.0%. Tick attachment was not detected in either ambient CO2 condition during the incubation period, indicating ambient CO2 does not impact the attachment rate under the presented condition. However, I. scapularis contact with the artificial membrane occurred at an increased rate of 0.014 female ticks in contact with the membrane per hour in the elevated CO2 condition (4%) compared with a rate of 0.01 ticks per hour in the air-typical CO2 condition (0.04%) (p=0.048) suggesting that the ambient CO2 level affects attraction to the blood but does not directly stimulate attachment of I. scapularis.

Title: Comparison of Small Molecule-Responsive RNA Aptazymes for Applications in Gene Control
Authors: Janeva Shahi [1], Maureen McKeague [1,2]
Affiliations: [1] Department of Pharmacology & Therapeutics, McGill University, Montreal, QC, Canada
[2] Department of Chemistry, McGill University, Montreal, QC, Canada
Keywords: Aptamer; Gene expression; Nucleic acid; Ribozyme; RNA; Small molecule
Abstract: Modelling how genes act in both space and time is critical to understand animal development, which can potentially drive intervention in gene expression. Gene regulation is examined using many techniques; however, challenges such as cell delivery, invasiveness, toxicity, and efficacy limit our ability to fully probe gene networks. Recent advances have led to the development of tunable, titratable, and reversible tools that can be genetically-encoded into animal model systems to modulate genes with temporal and spatial control. This study compares such tools, testing several aptazyme-based switches that can be expressed inside cells and controlled through the addition of non-toxic small molecules. Three switches responsive to different small molecules were compared for switching activity in mammalian cells. The most efficient switches in terms of activity gauged by their modulation of gene expression were then further assayed. Finally, the specificity of the hypoxanthine switch was tested based on chemical structure and classification. The comparisons revealed the importance of both timing and small molecule concentrations on switch activity, while the specificity testing demonstrated switch activity inside the cell correlated to the aptamer binding properties that were measured biochemically. This work demonstrates the suitability of aptazyme-based switches for application in diverse genetic environments, and in controlling and studying gene networks in animals.