I completed an undergraduate thesis project spanning over two years during the completion of my BSc Honours Cell Biology program (2009-2013) under the supervision of Dr. Gary Eitzen, Associate Professor in the Department of Cell Biology (University of Alberta). My project provided novel insight into the delivery mechanism of Rho proteins to membranes using a budding yeast model. I learned a variety of genetic and biochemical laboratory techniques that I am extending to my current research project that also utilizes a yeast model.

In September 2013 I enrolled into the MSc (Thesis) program under the supervision of Dr. Ben Montpetit, Assistant Professor in the Department of Cell Biology at the University of Alberta. As part of my early graduate training, I completed a two-week course specializing in cutting edge microscopy techniques at the RNA Therapeutics Institute (RTI) at the University of Massachusetts Medical School under the mentorship of Dr. David Grunwald. Dr. Grunwald has a PhD in optical physics, and at UMass he continues to develop imaging technologies and is a collaborator for my project. More recently, in September 2015 I transferred into the PhD program under the continued supervision of Dr. Montpetit in the Department of Cell Biology. My research project aims to understand the regulated process of mRNA export in eukaryotic cells, and includes the development of single-molecule imaging technology to study RNA transport in live cells. As a PhD student, I continue to develop my skills in advanced imaging technologies, yeast genetics, and various biochemical techniques needed for my thesis project.

In our Journal of Cell Biology publication, we show how single molecule imaging (SMI) technology allows for the visualization of single messenger RNAs in real time in live yeast cells. The movement of RNA molecules across the nuclear envelope is essential for the genetic program of eukaryotic cells, which includes export of mRNA from the nucleus to the cytoplasm for translation. The importance of this process is highlighted by the fact that mutation in various components of the mRNA export machinery results in disease, including cancer. Through this approach we find mRNA export to be very rapid (~200 milliseconds), we have identified a previously unknown mRNA particle behavior, and we have defined the spatial defects resulting from a mutation in a key factor required for export, thus demonstrating its essential role in the export process.

I would like to thank my supervisor Dr. Ben Montpetit, the members of the Montpetit Lab, and our collaborators (Grunwald and Weis Labs) for their contribution and support in the completion of this project. This work has been supported in part by the Canadian Institutes of Health Research and an Alberta Innovates Technology Futures Graduate Scholarship.