The Development Traveling Fellowship funded my trip to Dr. Yojiro Yamanaka's lab at McGill University, in Montreal, Qc (Canada). The purpose of this trip was to learn RNA microinjection and live imaging techniques for mouse pre-implantation embryos. We are studying the mechanisms underlying the first asymmetries in the mammalian embryo and how this leads to the formation of the first two lineages. Our preliminary data suggests that the transcription factor SOX2 may be involved in this process and its expression may be regulated by Hippo signaling. To investigate this further required the ability to manipulate gene expression in individual cells of the mouse embryo and track the fate of the injected cells over time.

In my stay here I learned how to microinject mRNA into 2, 4, and 8 cell mouse embryos. This process has many steps including synthesizing mRNA, making specialized pipettes from capillary tubes to hold embryos during injections, setting up the microscope, electrical circuit and injection equipment, learning the actual injection technique, and most importantly, learning how to troubleshoot when the injections are not occurring properly. During my visit I was able to learn all of these steps and monitor my injection success rate by injecting Gfp or Rfp mRNAs. This process is very technically challenging and I spent my three weeks in Dr. Yamanka’s lab practicing and learning the complications and pitfalls. I also learned how to live image embryos after injection and analyze the data collected using Imaris software. Live imaging allows you to follow the location of injected cells to determine their location throughout time, not just at the end point. This analysis also involves assigning each cell an identity at the start of the collection window and having the program track the progeny of each cell over time.

I am now ready to begin injections and collecting experimental data in my lab at UCSC. Learning all of these techniques was instrumental to our research and will allow us to determine the precise role of SOX2 in establishing the first two lineages of the mouse embryo. In addition, SOX2 is an important regulator of both human and mouse embryonic stem cell establishment, maintenance, and
differentiation. Our *in vivo* analysis provides a unique way to potentially shed light on the mechanisms regulating *Sox2* expression and the role of SOX2 in embryonic stem cells.