My research project in the Strassmann lab seeks to investigate the impact of genetic imprinting in humans on phenotypic characteristics, like height and birthweight. Data analysis has been performed on an RNA sequencing data set derived from molecular analysis of placentas collected from a Dogon cohort in Mali, West Africa. This cohort has been followed by Prof. Strassmann from infancy through adulthood and is now being extended to the next generation.

The RNA data are derived from tissue samples and therefore are not informative with respect to cell types and spatial context. To overcome this limitation, I plan to take advantage of the availability of formaldehyde-fixed and paraffin-embedded tissue samples, collected from the same placental biopsies from which RNA was sequenced. Preliminary analysis of the RNA data revealed that long noncoding imprinted RNA genes display a striking inter-individual variability in loss of imprinting. Therefore, I have selected several gene candidates that I plan to visualize using in-situ RNA hybridization assays over the course of the upcoming semester. I performed a literature search to find out what is known about these genes in human placentas. In particular, I mined single cell RNA-seq data sets to find information on cell type specific expression levels for the genes of interest. I’m using this information in combination with the RNA data from the Dogon placenta to prioritize the genes of interest. I will use the RNAscope® approach for in-situ hybridization which allows for the simultaneous visualization of 4 genes. High priority genes are highly expressed in syncytiotrophoblasts and have RNA larger than 300 bp, a requirement of the RNAscope® methodology.

Once we have the RNAscope® hybridization probes in hand, I will optimize the protocol for the use with the Dogon specimens with the help of Dr. Carol Elias, the director of the in-situ hybridization core facility. The images that I will collect will provide further insight into the expression of long noncoding imprinted genes in human placentas and their role in modulating imprinting.