PROJECT TITLE: Creating transgenes to study embryonic gene regulation

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Project Description

The Amanda Zacharias Lab is interested in how extra-cellular signals help turn genes on and off during embryonic development; this process is critical for developing different cells of different types, because cells like neurons and muscle cells need to express different genes to carry out their unique functions. We study this process in C. elegans, a non-parasitic microscopic worm that eats bacteria. C. elegans has the advantages of developing from a fertilized egg to an egg-laying adult with only 959 cells in only 3 days. Many developmental processes have been conserved from worm to human, so we can make important fundamental discoveries about biology using this simple model system. The worm is also transparent, so we have made worms carrying fluorescent reporter transgenes that show us where genes are expressed or where proteins are localized. Our laboratory is particularly interested in studying enhancers, pieces of non-coding DNA that act as switches to turn genes on and off, and how they are regulated by the Wnt signaling pathway, which is critical in the development of all animals and dysregulated in many human cancers. A student joining the Amanda Zacharias Lab will contribute to these fundamental discoveries by generating new fluorescent transgenes through PCR and molecular biology approaches. The student will also learn genetics by crossing existing worm strains to create new strains to study and microscopy skills to image the worms. The student will receive the necessary training to carry out all of these experimental skills and receive additional mentoring to present the results of their research to the group at the end of the 12 week project.