



**OPTIMIZING USE OF JANELIA FLUOR® DYES IN THE *C. ELEGANS*
GERMLINE TO INVESTIGATE THE ROLE OF HTP-3 PROTEIN
IN SYNAPTONEMAL COMPLEX ASSEMBLY**

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Meiosis is a cell division process that is crucial for sexual reproduction. It occurs by way of two rounds of chromosome segregation, resulting in four haploid gametes that are necessary for an organism to produce offspring. It is prior to the first round of meiosis (meiosis I) that synapsis between homologous chromosomes occurs and the synaptonemal complex (SC) is formed. The SC is also thought to take part in crossover (CO) events. COs are unique to meiosis in that they allow for exchange of genetic information between the maternal and paternal chromosomes that will eventually be passed to offspring through sexual reproduction. This recombination creates genetic variability that is important for diversity and future adaptation. COs also play a vital role in meiotic chromosome segregation. Despite its conserved role in sexual reproduction, the structure of the SC and its mechanisms of action are still largely unknown.

With my research, I am focusing on optimizing the attachment of Janelia Fluor® Dyes onto proteins found within the chromosomes of the nematode *C. elegans* in order to enhance imaging capabilities and better understand the function of cellular proteins. Previous studies within the Rog Lab have utilized different methods to produce images such as the use of green fluorescent protein (GFP) or antibodies. However, there can be significant drawbacks with these uses. Some of these could include disruption of the original protein, aggregation, bleaching, and dimly fluorescent images. The innovation of Janelia Fluor® Dyes has provided an advanced option for imaging, being substantially brighter, more stable, and localizing more specifically to proteins of interest which will ultimately provide a better image and also contribute to the ability of live imaging. Through these improved imaging capabilities, I plan to apply the fluorescent dyes to proteins involved in the process of meiosis in *C. elegans*, particularly in the assembly of the SC.

The fluorescent dyes have previously been used in the Jorgensen Lab at the University of Utah and generated superior results to other labeling methods. However, to image *C. elegans* precisely when the SC is forming, worms must be in the adult stage so that they have germ cells that are going through meiosis. This poses an issue because staining of *C. elegans* at the adult stage creates a buildup of dye within the gut of the worm, which lessens image quality. I am seeking to find alternative methods of staining *C. elegans* with Janelia Fluor® Dyes and establish an efficient and reproducible staining protocol. To determine the best protocol, I will collect data across a number of different alterations to the staining process, quantify image quality, and determine the most common outcome of the protocol. This protocol could then be applied to many proteins that are involved with the function of the SC.