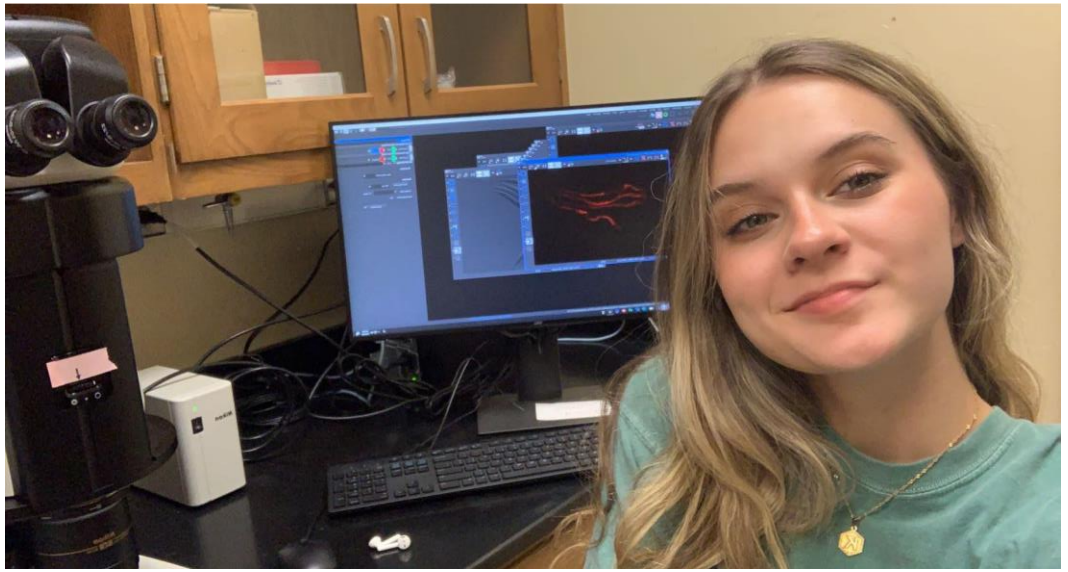
Characterization of the Novel Fluoride Resistant Gene *flr-3* in *C. elegans*



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Importance:

- Previous work has identified DRL-1 as a protein responsible for proper growth and fat metabolism in the nematode, *C. elegans.* A gene called *flr-3*, which confers resistance to fluoride exposure, produces the same growth and metabolic defects as *drl-1* when mutated, suggesting that the genes may act in the same pathway. However, the identity of the *flr-3* mutation remains unknown. Thus, further exploration is necessary to characterize the *flr-3* gene and mutant phenotypes or physical characteristics. This will provide novel insight into the molecular regulation of lipid homeostasis and growth.

Research Questions:

- What gene is responsible for producing the *flr-3* mutant phenotype when mutated? What type of protein does it encode for?
- How does the *flr-3* mutant phenotype quantitatively compare to the *drl-1* mutant phenotype?
- Does mutating *flp-2* produce the *flr-3* mutant phenotype?

- Results
  - *flr-3* mutants have a phenotype that is small in body size, slow growing, and lipid devoid, much like *drl-1* mutants. Known suppressors of *drl-1* also suppress *flr-3*, indicating that *flr-3* may work within the same pathway as *drl-1*. A cross between *flp-2* and *flr-3* strains revealed that *flp-2* is not the gene that produces FLR-3.
- Importance
  - Results suggest that FLR-3 potentially senses nutrients within the cell to decide how to allocate metabolic resources toward fundamental biological processes. Identification of *flr-3* as a regulator of proper development and lipid reallocation, and that it potentially plays a role in similar signaling as *drl-1* supports the model whereby pro-growth metabolism and innate immunity pathways may be communicating to regulate homeostasis.
- Broad Importance
  - The processes we are studying in *C. elegans* are evolutionarily conserved in humans. Therefore, better characterization of the various signaling pathways that contribute to lipid homeostasis in *C. elegans* may provide insight into the mechanisms underlying human metabolic disease.