Characterizing Candidate Genes for Sperm and Seminal Receptacle Length in *Drosophila melanogaster*

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**Background**

- The genetics of spermatogenesis has been well-studied for 20 years, but little is known about genetics of variation in sperm length.
- Sperm length is important in sperm competition, which occurs when females mate with multiple males and can evolve rapidly and contribute to new species formation via reproductive isolation.
- Sperm length coevolves with the length of the seminal receptacle (SR), a female sperm storage organ.
- Fruit fly is a model organism because of its small size, large family size, short life cycle, genetic manipulation methods and genes homologous to humans.
- In this research two genes were investigated: *crossveinless c* (*cv-c*) and *tenectin* (*tnc*).

**Methods**

- Mutant lines were obtained from the Bloomington Stock Center, Bloomington, Indiana.
- Each mutant line was crossed with its original genetic background to generate a genetically similar control.
- Virgin males were dissected at 5 days old, and virgin females were frozen at 5 days old and dissected at a later time.
- Seminal vesicles from males were dissected into 1X phosphate buffered saline (PBS), and sperm were spread on a slide, dried, fixed and stained, imaged on a Nikon upright microscope, and measured using ImageJ software.
- SR’s were dissected into PBS, secured under a coverslip with clay on the corners to achieve optimal compression, imaged and measured as above.
- A t-test was used to compare the mutant lines to the control.

**Results**

- There was no change in sperm length in both mutant lines. This result could mean that either these genes do not play a role in sperm length, or a functionally gene or set of genes is taking over the role of the knocked out gene. Alternatively, the knockout may not have been effective in *tnc*; future efforts will validate this using qPCR.
- However, longer SR’s were observed in *crossveinless c*. This result suggests that this gene plays a role in negatively regulating SR length and may have pleiotropic effects on sperm length.
- Pleiotropy acting on *crossveinless c* to control both sperm length and SR length is a possible mechanism for coevolution of these two traits across the *Drosophila* phylogeny.

**Future Directions**

Future studies will investigate:
- The roles of these genes during spermatogenesis.
- The role of more genes using mutant lines.

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**Works Cited**