

Background

C. elegans and potential genetic regulators

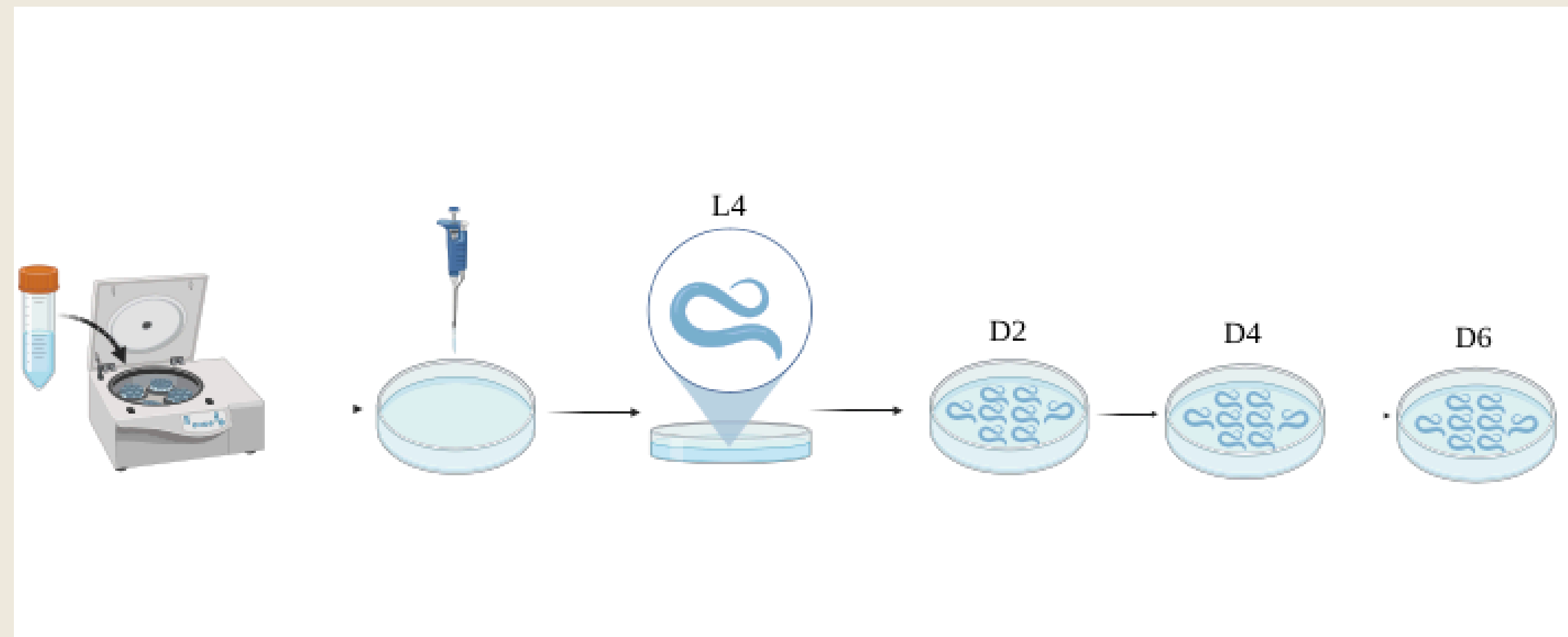
Female reproductive decline is an early hallmark of aging, and with more women postponing childbirth, this is becoming an increasingly important area of research. At the Templeman lab, we study how diet affects reproductive aging using *C. elegans*, a model organism with genetic similarity to humans in the regulatory pathway that controls reproductive functions.

Preliminary research shows that specimens in glucose enriched environments displayed accelerated reproductive aging and demonstrated signs of rapid oocyte deterioration. In my experiment, I used RNAi, a cellular process where small RNA fragments bind to mRNA to block protein synthesis, effectively turning off the *clec-5* gene. Sample specimens were fed bacteria containing the downregulated gene to investigate how silencing *clec-5* impacts reproductive aging.



Figure 1. D7 imaging of oocyte of *C. elegans* in plain to plain condition. Anna Tikhonova, 2024.

Methods



Hermaphrodite worms were synchronized via worm bleaching protocol, and resulting eggs were laid onto petri dishes. After 48 hours, ~70 L4 larvae were transferred onto 60 mm RNAi bacterial dishes. This process repeated every 48 hours until day 7 of their lifecycle where they mated with day 3 males. The resulting number of plates containing progeny were then counted and scored to calculate reproductive percentage.

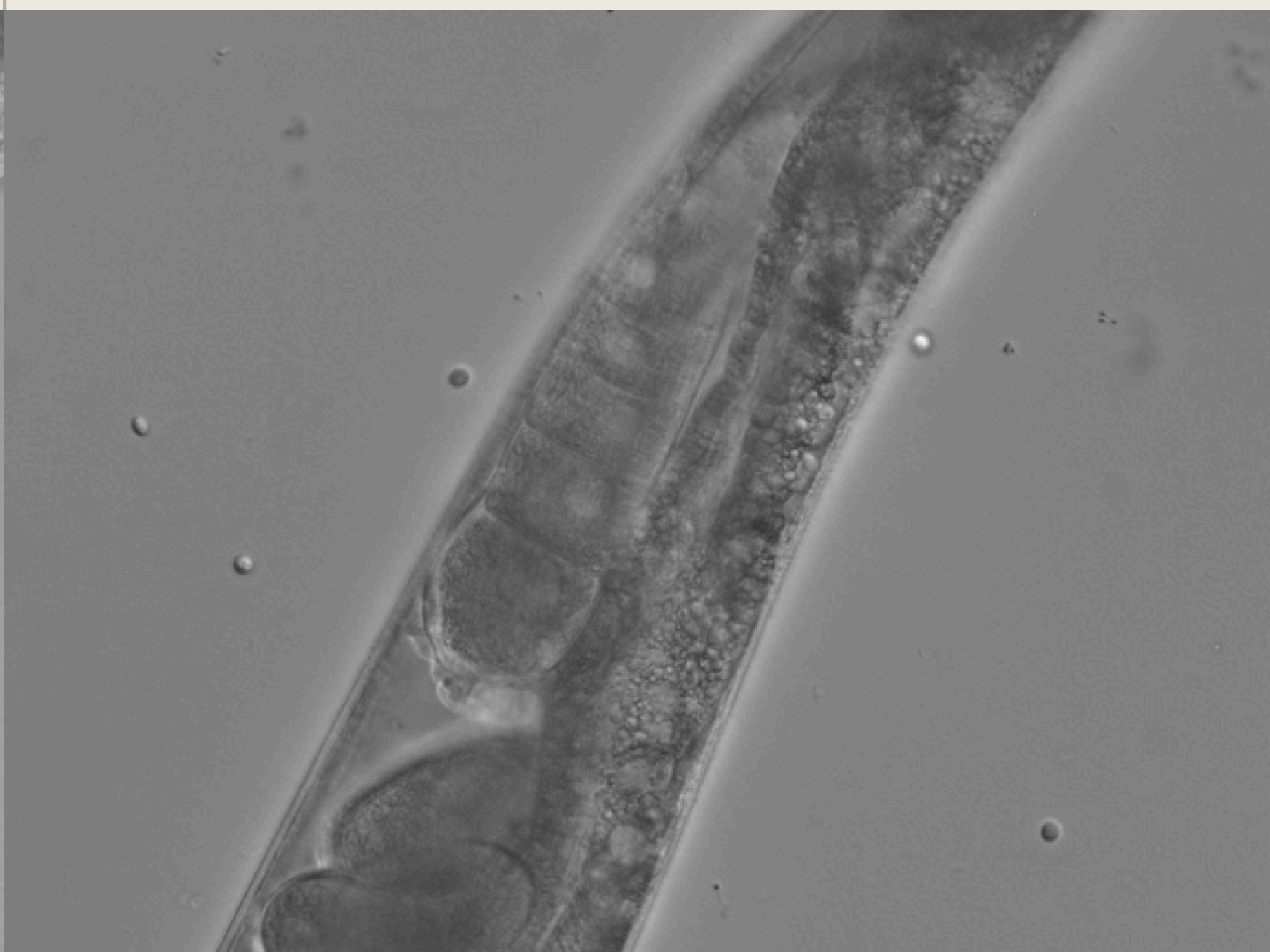


Figure 2. D7 imaging of oocyte of *C. elegans* in plain to glucose condition. Anna Tikhonova, 2024.

Results

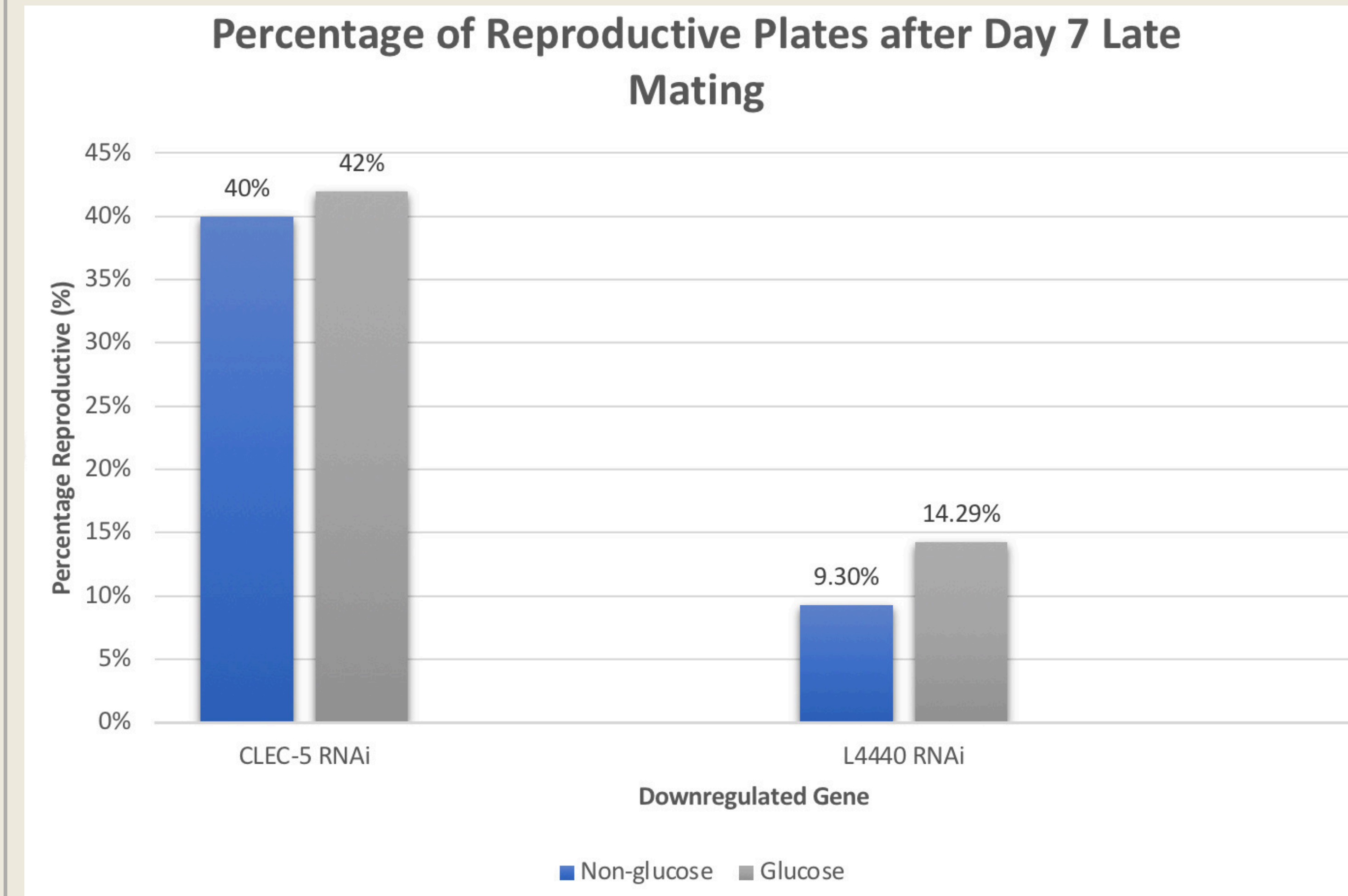


Figure 3. Percent reproductive plates after D7 late mating with male *fog-2s* from CLEC-5 non glucose (n=40), CLEC-5 glucose (n=24), L4440 non-glucose (n=43), L440 glucose (n=35).

Analysis

The downregulated L4440 gene displays a lower percentage of reproductive plates than the *clec-5* gene. Statistical analysis was conducted to assess the significance of reproductive rates between glucose and non-glucose conditions in *clec-5*, with the expectation of glucose to reduce reproduction. Using the Chi-square test for independence, the chi-square value was mathematically determined to be $\chi^2 = 0.017$. Reading off of the chi-square critical value table, *df* 1 and confidence level $\alpha = 0.05$ yielded a critical value threshold of 3.841. When comparing the two numbers, the critical value is greater than the chi-square value, therefore suggesting that any difference between glucose and non-glucose reproductive rates are not statistically significant for the *clec-5* downregulated gene.

Acknowledgements & References

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