

microRNA and piRNA in Diapausing and Non-Diapausing *Megachile rotundata* Embryos

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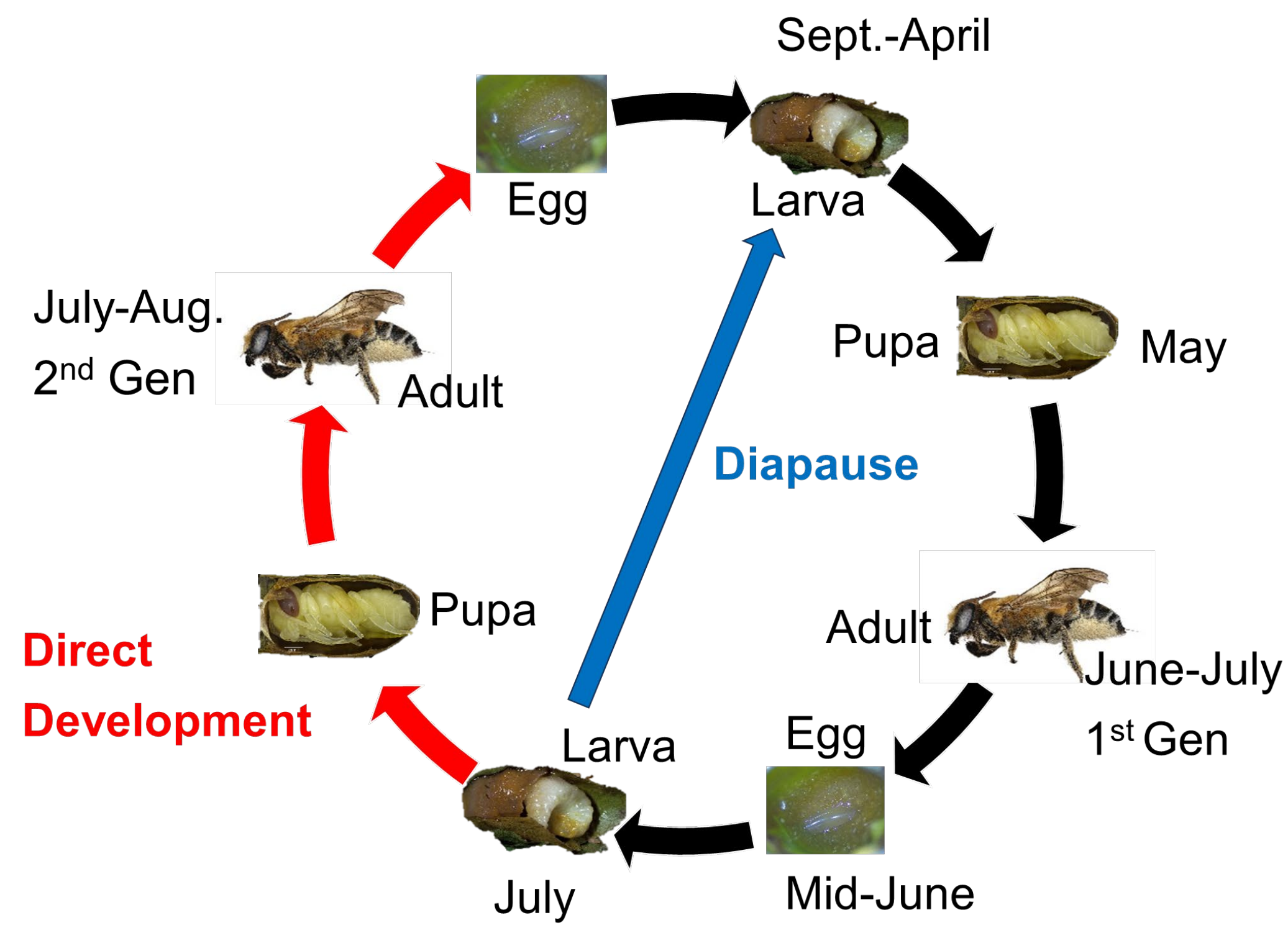
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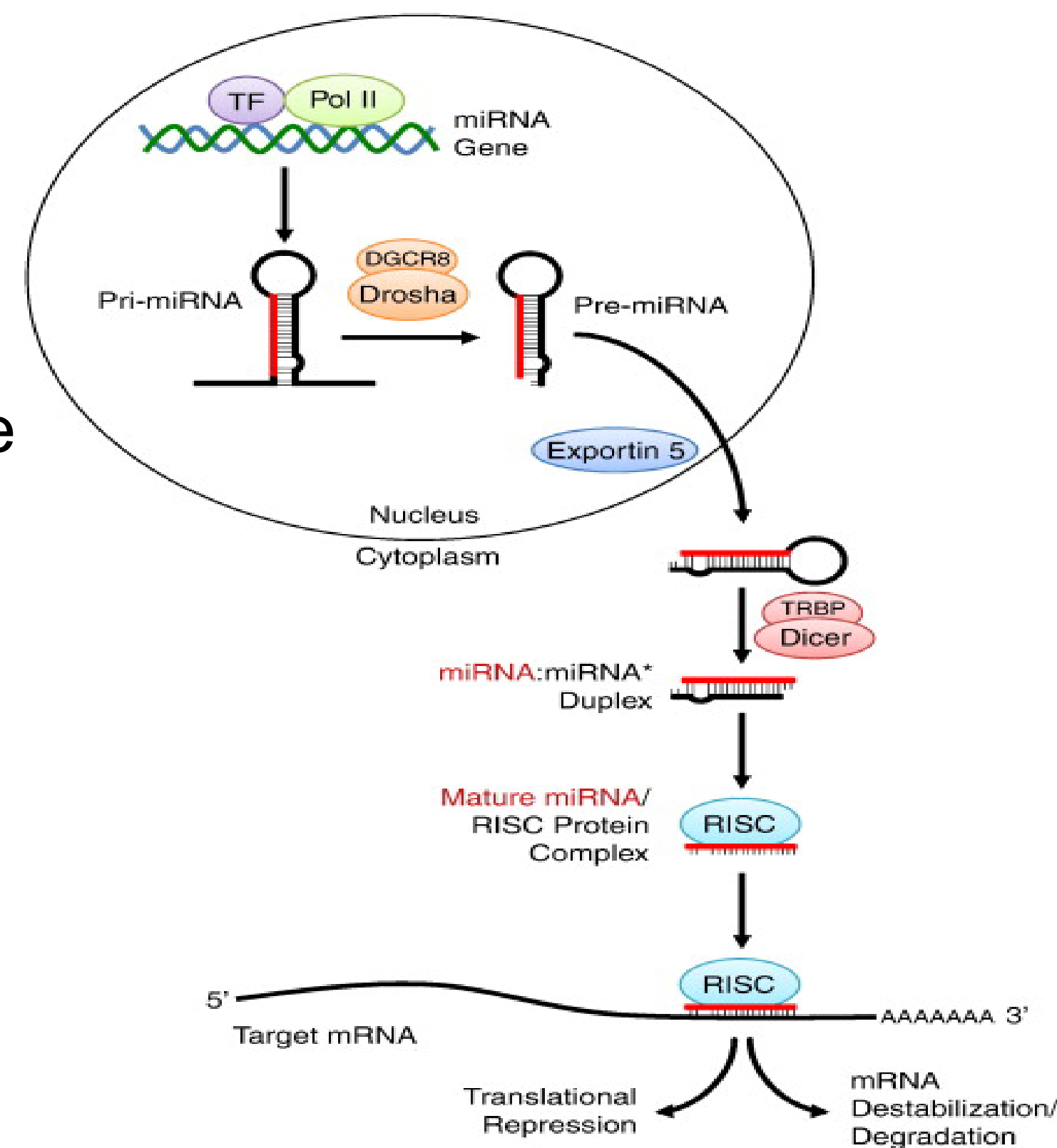


Introduction

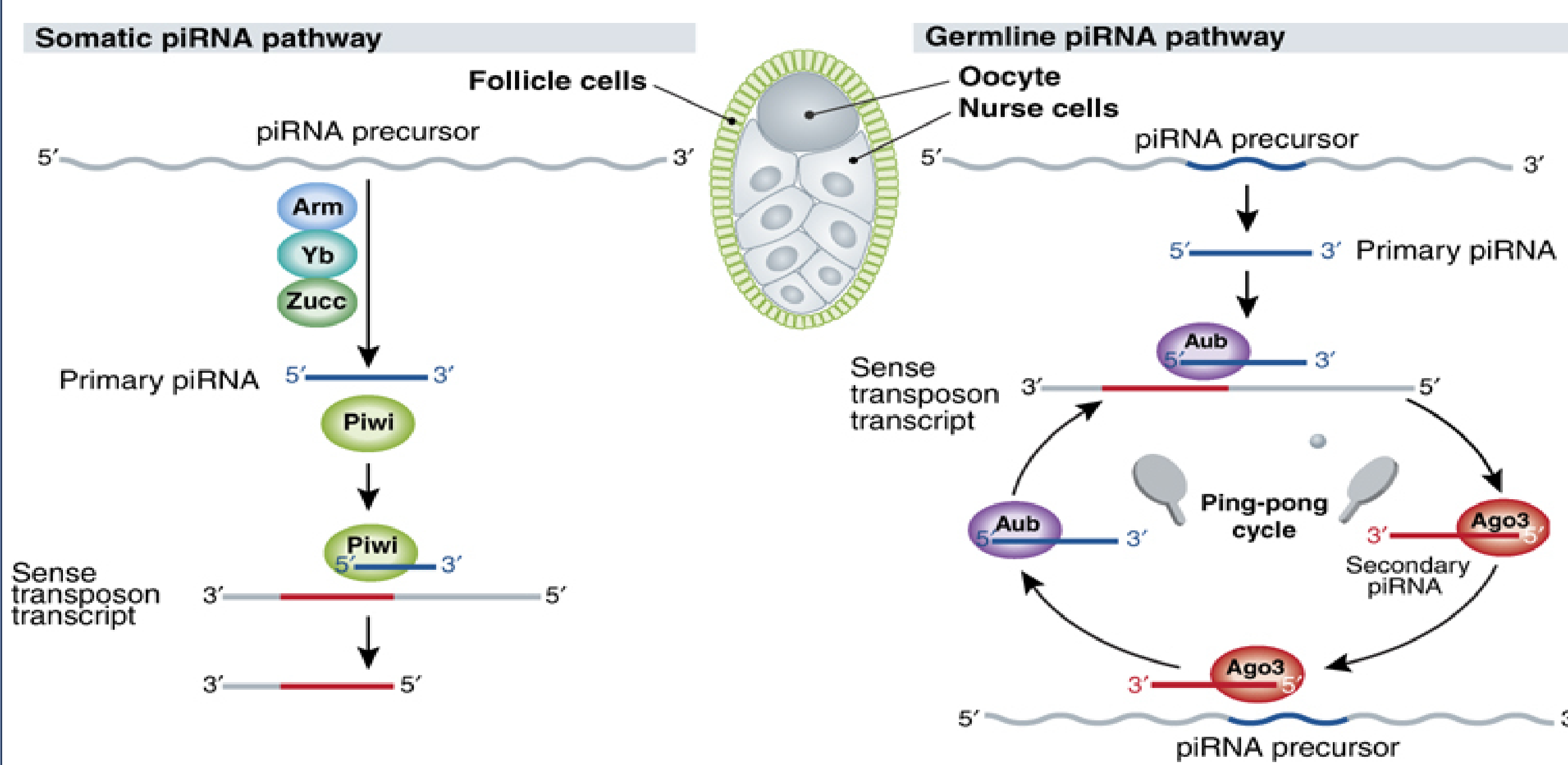
- Megachile rotundata* are facultative diapausers but it is unknown what causes diapause¹.



microRNA System



piRNA System

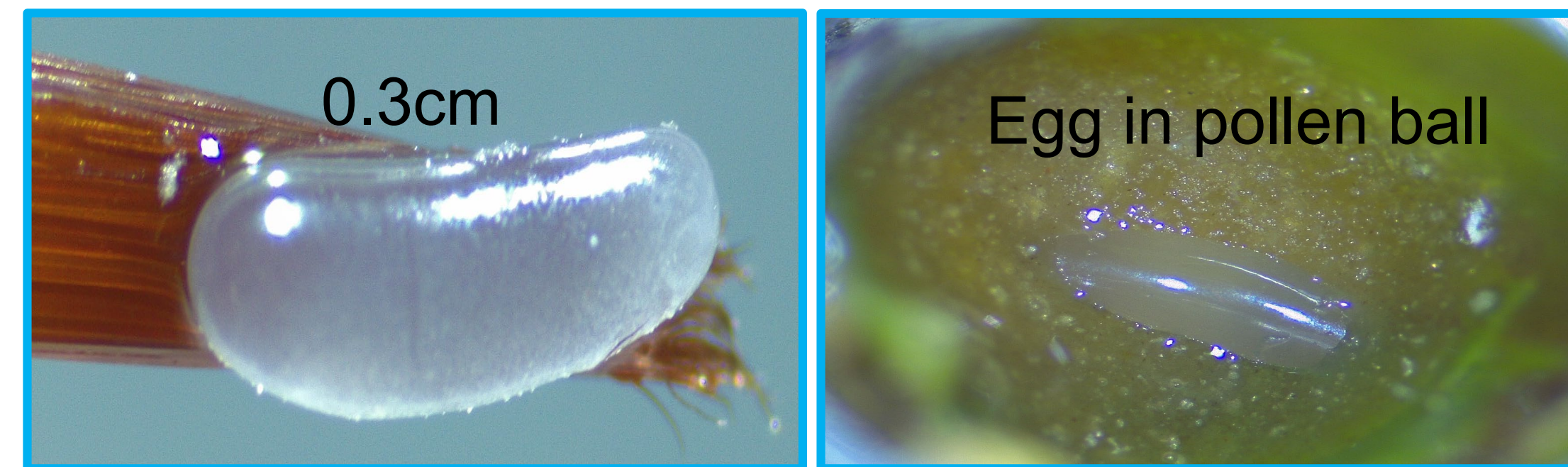


Questions

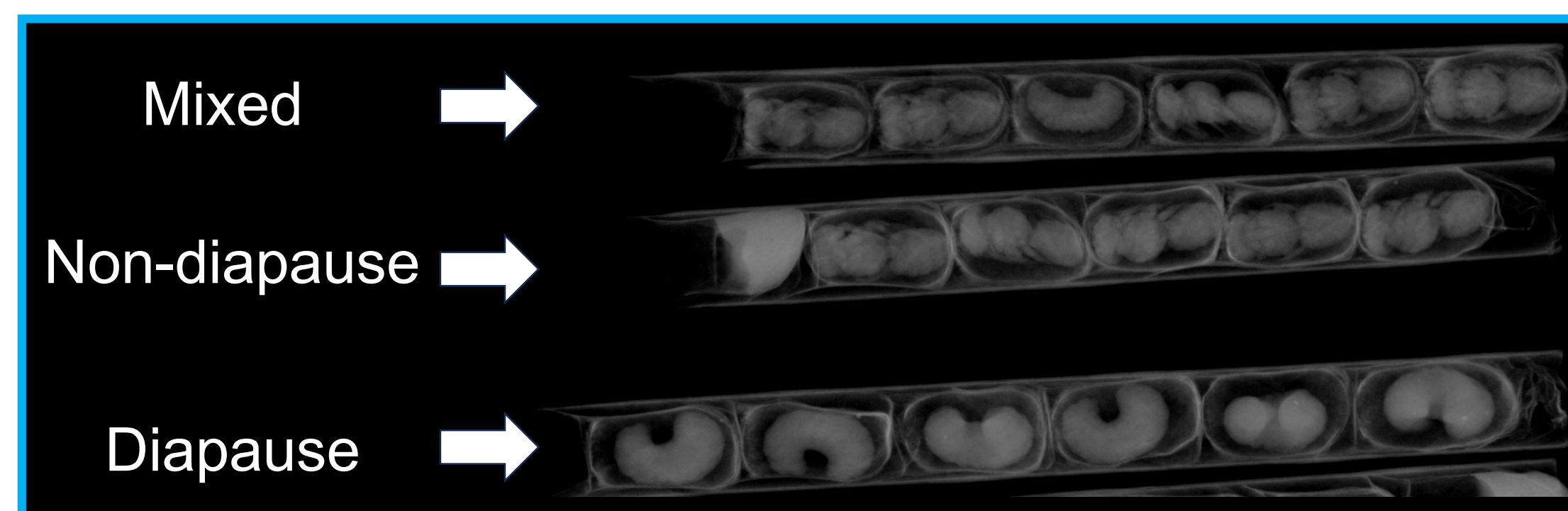
- Do microRNA and piRNA have any impact on facultative diapausing?
- Are there more of microRNA and piRNA present in diapause destined eggs?

Methods

- Eggs were collected within 24 hours of being laid.



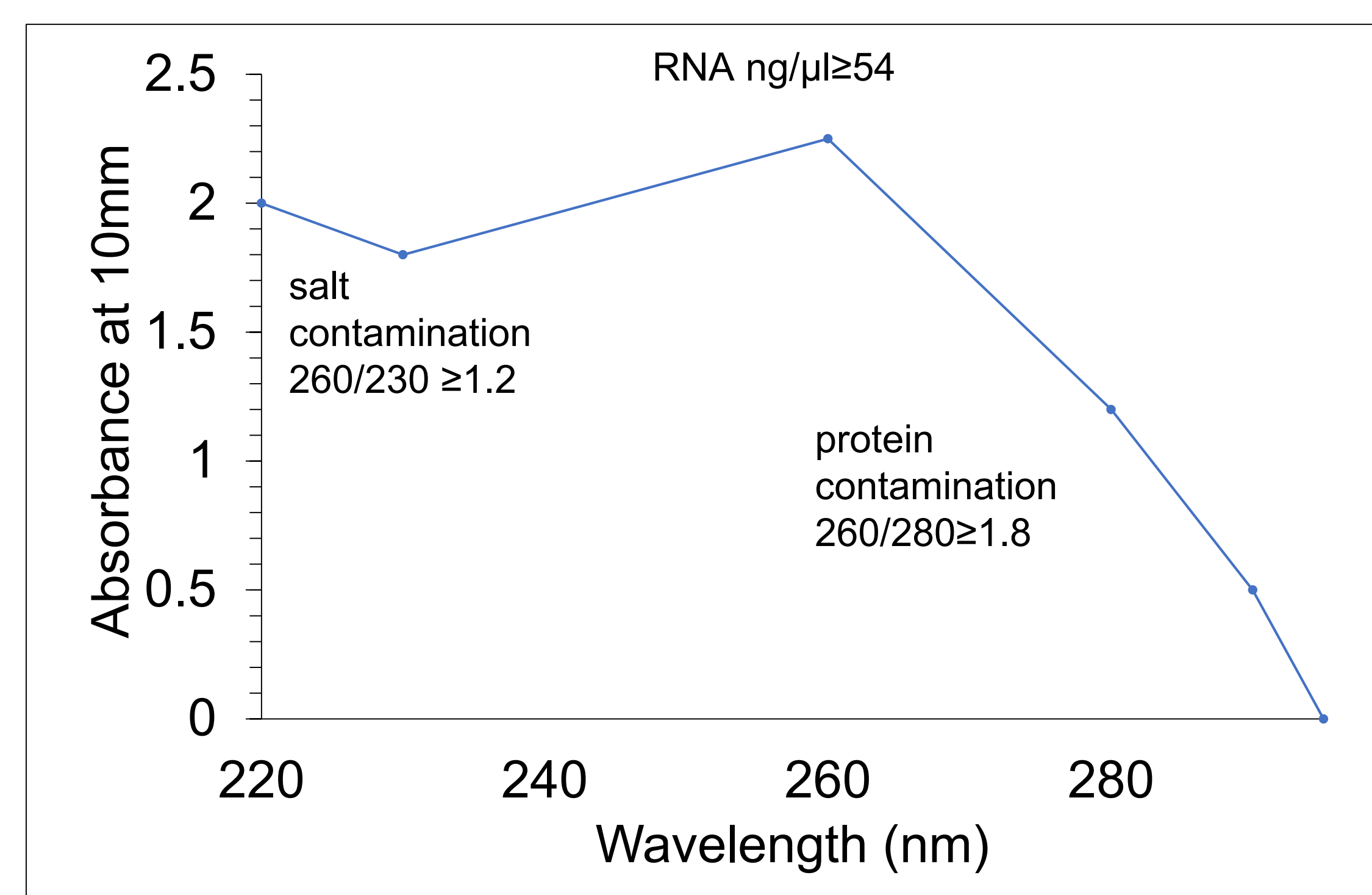
- Eggs were flash frozen and placed in -80° C.
- Waited for the rest of the nest to indicate diapause destiny (≥ 15 days).



- Individual embryo had RNA extracted using Zymo research kit direct-zol RNA MicroPrep.



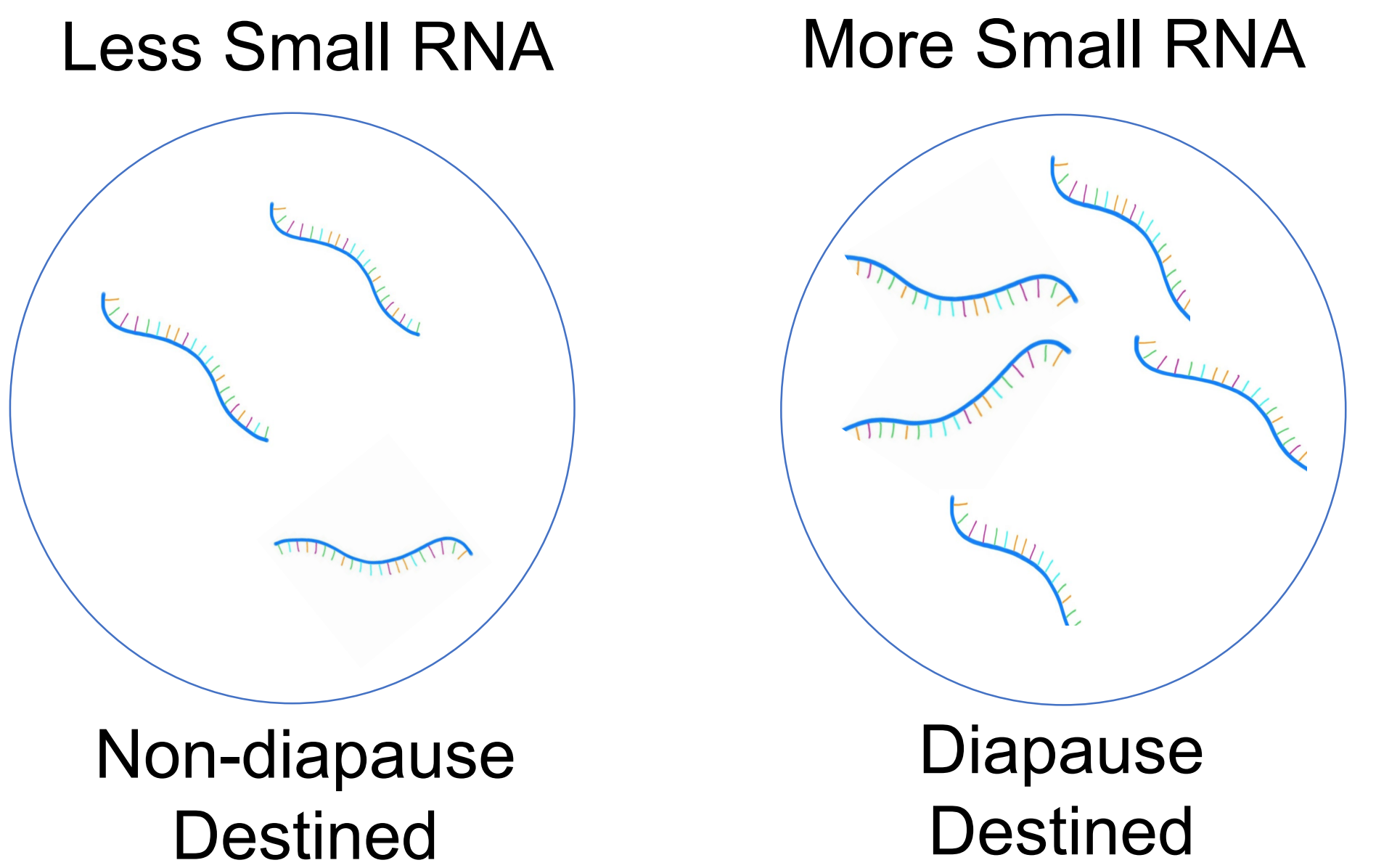
- RNA was checked to see how much RNA was collected from a single embryo in a nanodrop.



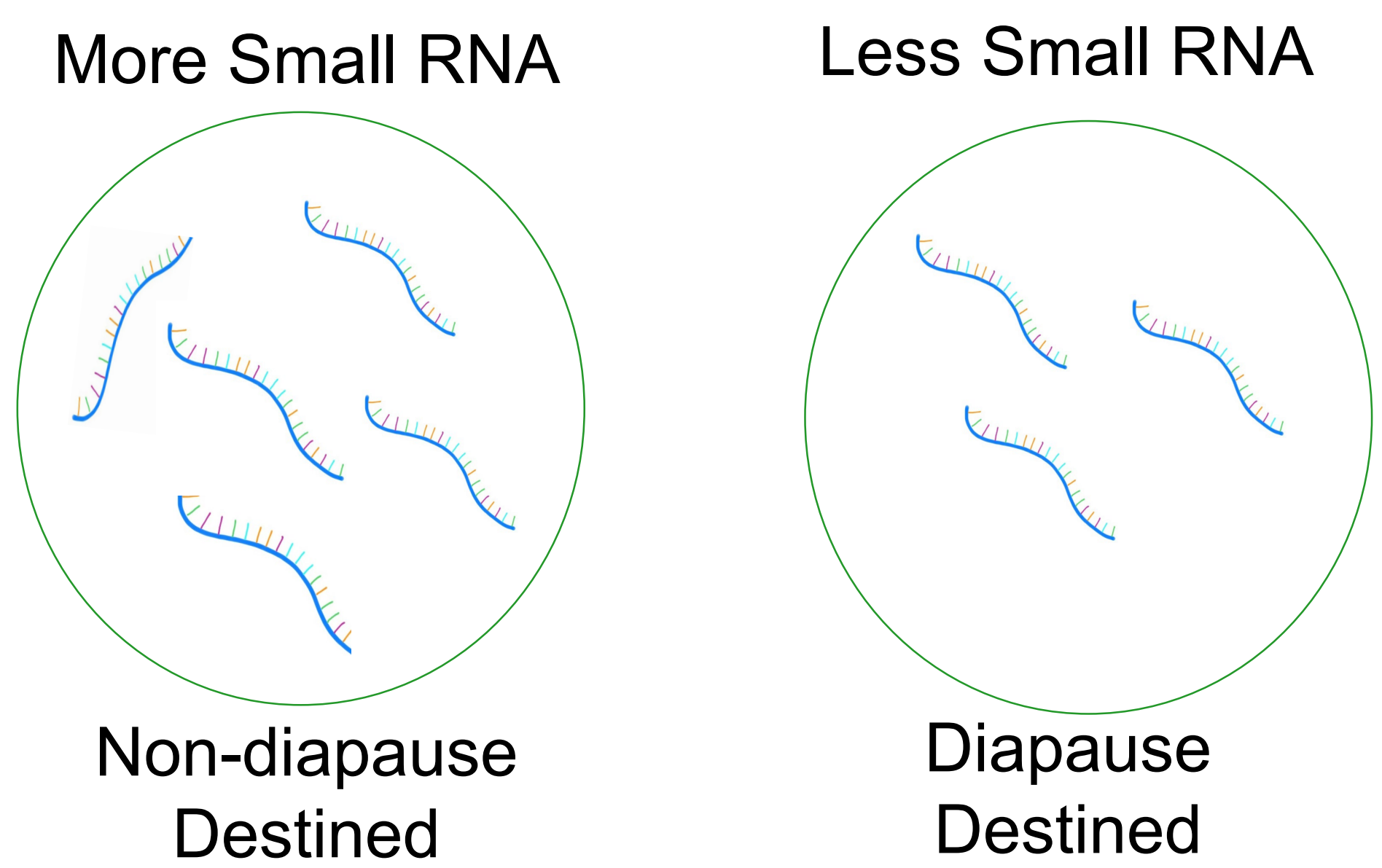
- Samples within parameters were sent to be sequenced by BGI Genomics.

Expected Results

Option A



Option B



Future Directions

Route one: There is a Difference

- Testing to see what specific small RNA is controlling diapause.
- Seeing if we can inhibit the small RNA to control diapause within *Megachile rotundata*.

Route two: No Difference

- Small RNA does not effect diapause.
- Use the data collected to instead look at transposable elements.

Acknowledgements

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References

- Wilson, E. S., Murphy, C. E., Wong, C., Rinehart, J. P., Yocum, G. D., & Bowsher, J. H. (2021). Environmental impacts on diapause and survival of the alfalfa leafcutting bee, *Megachile rotundata*. *PLOS ONE*, 16(8). <https://doi.org/10.1371/journal.pone.0254651>
- Johnson, M. M. (2022). MATERNAL EFFECTS AND MANAGEMENT OF ALFALFA LEAF-CUTTING BEES. *Utah State University ProQuest Dissertations Publishing*.