How Various Feeding Rates Affect Pupation Rates in *Anopheles stephensi* Larvae

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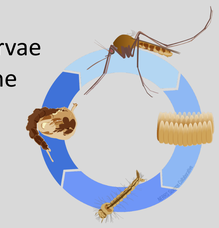
Background

•*Anopheles* mosquitos have four main stages in their life cycle; egg, larvae, pupae, and adult
•Within the egg stage, the egg will hatch into a larvae that eventually undergoes **pupation**, becoming the pupae from which the adult mosquito emerges
•This study focuses on the rate at which larvae will undergo pupation and become pupae



Introduction

•*Anopheles stephensi* are a vector of many diseases
•This species requires specific needs to reach maturity, and therefore become viable for infection
•Mosquito larvae are very fragile and any deficiency in food will cause a lack of development or negatively impact their reproductive workings as adult mosquitos (Schoor 2020)
• If we can stop the larvae from pupating, or delay its pupation rates, this could negatively impact the mosquito's growth

Research Question

•**Question:** How does the rate of feeding affect mosquito larvae pupation rates? Which feeding rate will result in the highest pupations rates among *Anopheles stephensi* larvae?
•I believed that Feeding Type 3 would result in the highest pupation rates due to the larvae being given more food at a faster rate compared to the other two feeding types
•**Hypothesis**: Under these conditions, the larvae trays provided with Feeding Type 3 will likely grow the fastest and have the highest pupation rates.

Methods

Within this experiment, these were the guidelines we followed for two weeks of data collection:
The week before gathering data, that Monday would be spent dispensing larvae, each tray receiving ~300 larvae along with 1000ml of deionized water and 2.5 medium TetraFin fish pellets
1.Within the next week, the three groups of trays were given three different Feeding Types, as shown below, with each group receiving a different amount of medium TetraFin pellets on **Tuesdays** and **Wednesdays**
3. On Friday, the final pupae would be collected and counted, then the remaining larvae would be counted and euthanized

	Day 0	Day 1 Monday	Day 2 Tuesday	Day 3 Wednesday	Day 4 Thursday	Day 5 Friday
Feeding Type 1	0	5	4	4	0	0
Feeding Type 2	0	5	5	3	0	0
Feeding Type 3	0	5	6	2	0	0

Results

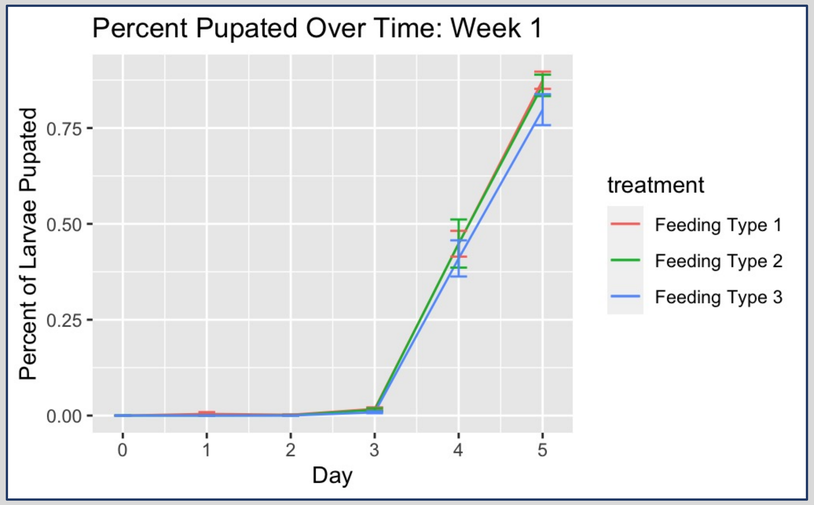


Figure 1a. The means of percent larvae pupated in each group based on Feeding Type 1, 2, and 3 are shown across the span of week one. This shows that, while Feeding Type 1 and 2 seem to result in higher pupation rates, it is not significant.

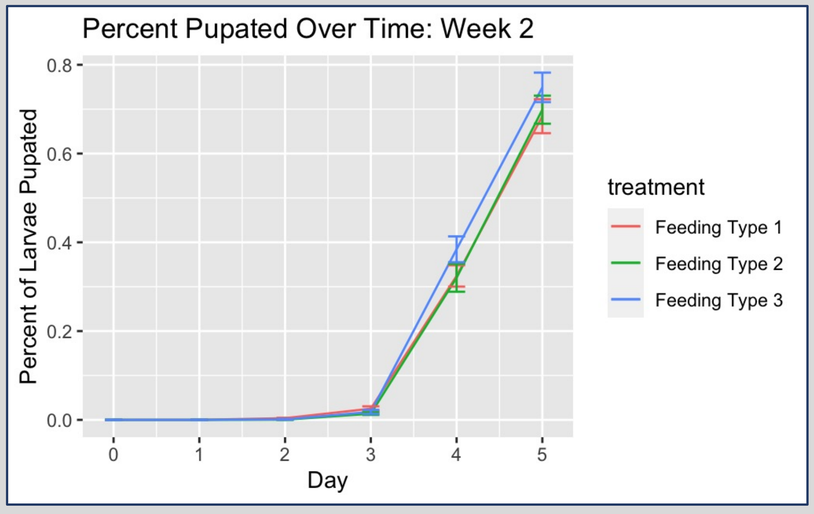


Figure 1b. The means of percent larvae pupated in each group based on Feeding Type 1, 2, and 3 are shown across the span of week two. This shows that, while Feeding Type 3 seems to result in higher pupation rates, it is not significant from the other two feeding types.

Discussion

•All treatments were proven to be very similar, not one treatment stood out among the others, so we could not draw clear conclusions from this data
•Along with this, all groups of larvae did not reach 100% pupation due to not counting percent pupated on Saturdays (Day 6).
•The hypothesis is rejected given that Feeding Type 3 did not have any significant advantage in pupation rates over the other two feeding types
•This supports the idea that feeding rates do not impact pupation rates of mosquito larvae

Future Studies

•If I were to attempt this experiment again, I would have added more extreme feeding types, such as feeding them 5, 10, or 20 pellets a week instead of 13 pellets
•Given this information, I would be interested in using these studies to venture further into different factors that could impact pupation, such as hormones, temperature, or pH for example
• This could show whether or not chemical runoffs from farms, pollution, or climate change impacts pupation rates in mosquitos

Acknowledgements

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References

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