



Growth and Development in Lady Beetles

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Abstract

Living in a group can potentially put stress on an animal. This is particularly true for species like *Hippodamia convergens*, the convergent lady beetle, the larvae of which will cannibalize each other when food sources are limited. This can raise the question of whether or not living in a group affects the growth and development of an individual, and how the growth rate might differ for an individual who is raised alone. This experiment attempts to answer that question by comparing 12 colonies of lady beetles, some of which were reared in groups, some reared alone, and recording the pupation lengths. The hypothesis was that the individuals raised alone would grow and pupate faster than the groups, because they would not have to compete for space or resources. It was ultimately found that while pupation and hatch dates for individual lady beetles were far more variable, there were no large differences in the average length of pupation between groups and individuals.

Purpose

Compare pupation rates in lady beetles reared in groups and lady beetles reared alone, and determine any effects that living in either condition may have on growth.

Questions, Hypotheses, and Predictions

Question: Will the length of pupation differ between groups of lady beetles and individual lady beetles? What factors might influence differences in growth rates?

Hypothesis: Lady beetles reared alone will grow and pupate faster than the groups.

Study System

The convergent lady beetle is one of the most abundant species in the family Coccinellidae, and can be found throughout North America. Their primary food sources are aphids, scale bugs, and other soft bodied insects, though they've been known to feed on sap from plants as an additional source of nutrition and hydration. Females need to consume large amounts in order to lay eggs, which are deposited in clusters on the underside of leaves. Lady beetles are considered to be beneficial, and are often used for the biological control of pests.



Methods and Experimental Design

The larvae were separated into 12 separate colonies upon hatching. Each colony consisted of a group of four housed in a petri dish together, and four individuals housed in petri dishes separately.

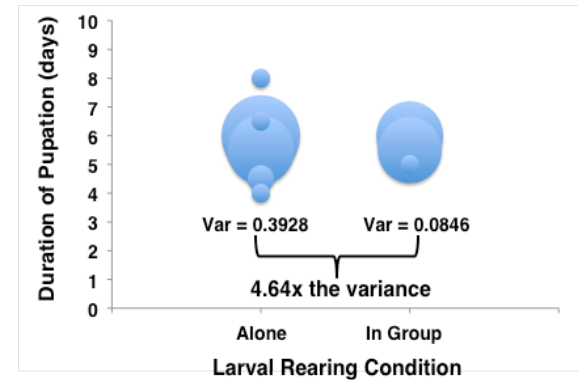
The larvae were fed moth eggs once a day and were given a water soaked sponge to drink from. As they molted and grew larger they were given more food. When the larvae began to enter the pupal stage, they were checked twice a day. The date of pupation was recorded, as well as whether the pupation began in the morning or afternoon. When the adults hatched from the pupas, they were removed and placed in a separate colony.



Results

The lady beetles raised in groups hatched out within a narrower window of time, within a half a day of each other. There was much more variance within the lady beetles reared alone. This is likely because the lady beetles housed in groups faced the threat of cannibalism, though more testing is needed to confirm this hypothesis.

Conclusions



Future Directions

If I were to do this experiment again, I may try to house them in something other than petri dishes. Perhaps the partitioned dishes used in the original experiments. It might also be worth trying to see that the amounts of food given were more consistent. It would have been beneficial to talk to my lab partners to make sure we were all giving roughly the same amounts to the larvae. Additionally, if larger amounts of food were given the larvae in third or fourth instars, perhaps excessive cannibalism could be avoided. In a similar vein, a couple of the groups had multiple cannibalism events that resulted in only one individual being left. Next time I would try to factor that in more. That said, overall the experimental design worked quite well, with the majority of our larvae managing to reach adulthood relatively unscathed. It's definitely a worthwhile project for small groups.

References

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