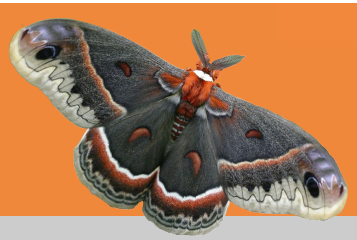

Variation in Larval Growth Rates and Pupa Mass in the Cecropia Moth (*Hyalophora cecropia*)

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Background

- Cecropia moths (*Hyalophora cecropia*) progress through 5 larval instars (figure 1) over 3 months before spinning a cocoon.
- The nutrients required for the adult moths to find a mate and deposit eggs must be acquired in the larval stage (Waldbauer 1985).
- The growth rates during each instar varies among caterpillar species and among individuals of the same species (Esperk 2007) (and see figure 2).
- Through each instar, larvae experience changes in physiology and ecology, thus each instar are treated as a separate life stage (Tammaru 1998).
- Increased knowledge of which instar has the greatest change in the accumulation of biomass and its correlation to final pupal size, is essential to installing effective conservation methods.
- We asses whether the average growth rate during the final three instars or growth rates averaged within specific larval instars explains variation in final pupal weight.

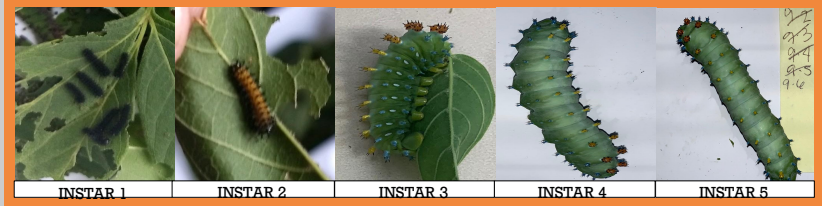
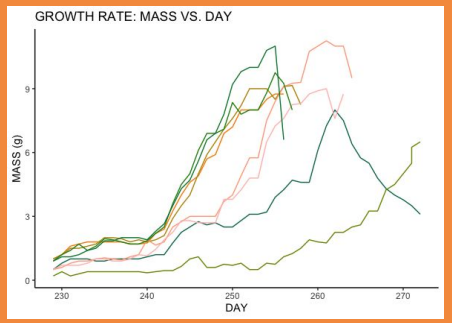


Figure 1. Caterpillar at each of the 5 instars.

Figure 2: Growth rates of the individual caterpillars from the initiation of the 3rd instar to pupation



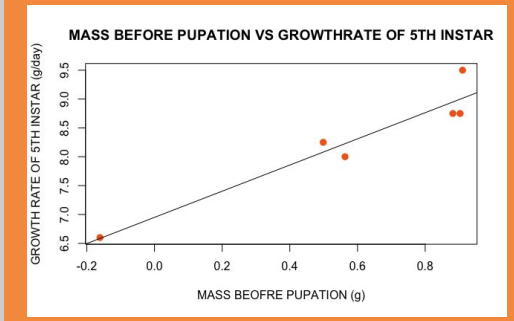


Figure 3. Variation in growth rate during the 5th instar best explains variation in final pupal mass. ($F_{1,4}$=42.22, P<0.003, R^2_{adj} = 0.89).

Methods

- We reared 19 cecropia caterpillars from egg to pupa during the 2020 season for a study of adult flight morphology. 8 were selected for a pilot study on caterpillar growth rate
- We fed the caterpillars box elder (Acer *negundo*) leaves *ad libitum* and measured daily mass to quantify growth.
- We defined growth rate as the value of the slope when plotting the day of growth against the mass.
- We use LM and model selection to determine how variation in larval growth rates explains variation in pupa (and therefore adult) mass.

Results & Discussion

- The results indicate that the average growth rate of the fifth larval instar best predicts the mass before pupation (Fig. 2) .
- The fifth larval instar is the last opportunity for the caterpillar to obtain nutrients for the duration of its adult life. It may be beneficial for the caterpillar to experience the greatest rate of growth in this fifth and final instar.
- The ability to predict which instar is the most developmentally important can contribute to ensuring nutritional support for conservation efforts.

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