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The Developmental Response to Varying Growth Rates in *Romalea Guttata*, the Eastern Lubber Grasshopper

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Poster Presentation 6

THE DEVELOPMENTAL RESPONSE TO VARYING GROWTH RATES
IN *ROMALEA GUTTATA*, THE EASTERN LUBBER GRASSHOPPER

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Life history traits such as the size and relative age of an organism can greatly influence an individual's survival and reproductive success. These traits can vary between individuals in a species, due to environmental conditions during juvenile development. We examined how changes in food availability during juvenile stages of development can affect the size and timing of eclosion (i.e. adulthood) in *Romalea guttata*, the Eastern Lubber grasshopper. Hatchling *R. guttata* were raised on nine treatment groups consisting of a high food diet, a low food diet and switches from low to high food, high to low food, and high to no food diets. The switches were made at significant points in the insects development corresponding to different instars (i.e. stages of development). When food availability was high in the second through the fourth instars insects took significantly less time to reach adulthood than insects with low food availability in the middle three instars. The same trend occurred in the mass of the insects at eclosion; when high food availability occurred in the middle three instars, insects weighed significantly more than insects fed low food in the middle three instars. This suggests that both the time to and size at eclosion were determined in the middle of the nymphal life cycle, and that feeding in the first and last instar did not affect development. Other tests were done to examine whether insects with low food availability could increase their feeding efficiency, but our results did not support this hypothesis. Our results suggest that developmental cues are set at a particular developmental state, and proceed independently of feeding in the later instars. This suggests that development does not continuously adapt to changes in food availability, and there is strong evidence for biological cues which can cause development to proceed regardless of feeding. The concept of fixed or unresponsive development, in turn, may constrain an individual's ability to adapt to varying environments, resulting in a decrease in survival and reproductive success.