A Threshold for Initiating the Canalized Phase of Reproduction in the Lubber Grasshopper

Jennifer Olson, '02
Illinois Wesleyan University

Steve Juliano, Faculty Advisor
Illinois Wesleyan University

Follow this and additional works at: https://digitalcommons.iwu.edu/jwprc

Olson, '02, Jennifer and Juliano, Faculty Advisor, Steve, "A Threshold for Initiating the Canalized Phase of Reproduction in the Lubber Grasshopper" (2002). John Wesley Powell Student Research Conference. 17.
https://digitalcommons.iwu.edu/jwprc/2002/posters3/17

This is protected by copyright and/or related rights. It has been brought to you by Digital Commons @ IWU with permission from the rights-holder(s). You are free to use this material in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/ or on the work itself. This material has been accepted for inclusion by faculty at Illinois Wesleyan University. For more information, please contact digitalcommons@iwu.edu.
©Copyright is owned by the author of this document.
The reproductive cycle of the lubber grasshopper, *Romalea microptera*, is believed to consist of two phases: a plastic (flexible) phase during which feeding rate affects reproductive timing and allotment, and a later, canalized (inflexible) phase, in which feeding rate has no effect on reproductive outcome. The duration and cues for initiation of this phase are currently unknown. We hypothesize that the initiation of this canalized phase of oogenesis begins when the level of hemolymph protein (derived from feeding) exceeds a threshold, and is therefore dependent on the amount of food eaten. Two mathematical descriptions of the timing of these phases of reproduction were considered: one in which the threshold is constant, and one in which the threshold decreases linearly with the amount of food consumed. Both models predict that the time to oviposition should be linearly related to the inverse of the daily food ration, with the slope of the regression estimating the threshold (in units of mass of food) and the intercept estimating duration of the canalized phase. We tested this hypothesis by assigning newly eclosed females to different daily rations of Romaine lettuce. We tested linear and quadratic regressions of age at oviposition versus the inverse daily food ration for both models to test the prediction of linearity. Linear regression was significant for the constant threshold model, with $r^2 = 0.621$. Quadratic parameters were not significant ($P > 0.05$). Our results yield estimates of the duration of the canalized phase of 23.5 days and a threshold of 4.0 g (dry mass) of lettuce. Our data are thus consistent with our hypothesis of a simple, fixed threshold for food eaten that is the determinant of the initiation of the canalized phase of reproduction. Supported by NSF grant DBA-9978810 to SAJ.