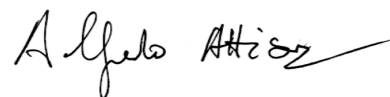


**Life-history variation and evolved response to
food stress in *Oncopeltus fasciatus* (Hemiptera:
Lygaeidae)**

Submitted by Alfredo Attisano, to the University of Exeter as a thesis for the degree
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Abstract

Every organism needs to survive and successfully reproduce in the face of changing environmental conditions in which variation in resource availability can seriously limit performance. Organisms can respond to the variation in quality or availability of food resources with behavioural and physiological accommodations going from the baseline physiological response to environmental stressors to complex life-history strategies like migration and diapause. In insects, one avenue to cope with the resources' variation is to plastically tune the reproductive system to the environmental conditions in order to shift resources away from reproduction during unfavourable periods but maximize it when resources are abundant. I studied the role of reproductive physiology in both males and females in mediating a response to challenging conditions determined by a lack of food resources or the presence of qualitatively different diets using the milkweed bug, *Oncopeltus fasciatus*, as model species. I studied the role of oosorption, a plastic physiological response through which resources can be recovered and redirected to body maintenance and survival, in shaping behavioural strategies to cope with challenging environments. I also studied the effects of diet quality on male's sexual behaviour and how these modulate the trade-offs between reproduction and survival. I then investigated how the effects of diet quality, sexual maturation and rearing conditions influence the occurrence of reproductive diapause in both males and females. I found that females exposed to different diets plastically adapt their schedule of reproduction depending on diet quality: this also influences the occurrence of oosorption in the ovary mediating the amount of resources that are directed to reproduction or survival. Diet quality influences males' sexual behaviour so that even after a long-term adaptation on an alternative artificial diet, they invest more in reproduction at the expenses of survival

when fed on an ancestral high quality diet; this is achieved with a shift in the trade-off between reproduction and survival. The occurrence of reproductive diapause in both males and females is a function of several factors: the quality of food resources ultimately modulates sexual maturation in adult individuals determining the occurrence of diapause or reproduction. Finally, oosorption may be involved in the evolution of alternative condition-dependent strategies as an adaptive physiological mechanism to cope with stressful environments; thus females from different populations may be able either to migrate in favourable areas where they can exploit abundant food resources or remain residents and perform high levels of oosorption to cope with the seasonal shortage of food.

List of contents

Title page: Life history variation and evolved response to food stress in	1
<i>Oncopeltus fasciatus</i> (Hemiptera: Lygaeidae)	
Abstract	2
List of contents	4
List of tables and figures	5
Author's declaration	8
Introduction	10
Chapter 1: Oosorption in response to poor food: complexity in the trade-off	49
between reproduction and survival	
Appendix A1: Oosorption assay on three diet treatments	73
Chapter 2: Reproduction-longevity trade-off reflects diet, not adaptation	81
Chapter 3: Observations on the reproductive diapause in wild and	103
laboratory adapted strains of the milkweed bug, <i>Oncopeltus fasciatus</i>	
Appendix A2: Chapter 3 supplementary data	136
Chapter 4: A simple flight mill for the study of tethered flight in insects	138
Appendix A3: MatLab script for the analysis of the flight mill's data	155
Chapter 5: Reproductive physiology and the evolution of a partial	158
migratory strategy	
Concluding comments	185
Acknowledgements	197