

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**Aspects of the Ecology of *Trachymela catenata* Chapuis
(Coleoptera : Chrysomelidae) in New Zealand.**

A thesis presented in partial fulfilment
of the requirements for the degree

of

Master of Science

in **Ecology** at

Massey University

Douglas Paul Barrett

1998



Table of Contents

Abstract	iv
Acknowledgements	v
Chapter 1. Introduction	1
The Eucalypts	1
Eucalypt forest insects	3
Eucalypt plantation forest pests and biocontrol	7
The Paropsina	14
History of <i>Trachymela catenata</i> in New Zealand	17
Study sites	18
References	22
Chapter 2. Ecology of the recently established paropsine <i>Trachymela catenata</i> Chapuis (Coleoptera : Chrysomelidae) in New Zealand: Life history, Phenology, Mortality and Development.	32
Abstract	32
Introduction	33
Methods	36
Results	45
Discussion	56
References	68
Chapter 3. Larval performance and oviposition preferences of <i>Trachymela catenata</i> Chapuis (Coleoptera : Chrysomelidae) on eight species of <i>Eucalyptus</i>.	73
Abstract	73
Introduction	74
Methods	77
Results	81
Discussion	87
References	93
Chapter 4. Comparative studies of the effects of the parasitoid <i>Enoggera nassau</i> Girault (Hymenoptera : Pteromalidae) on <i>Trachymela catenata</i> Chapuis and <i>Paropsis charybdis</i> Ståhl (Coleoptera : Chrysomelidae).	98
Abstract	98
Introduction	99
Methods	104
Results	106
Discussion	109
References	113
Chapter 5. Conclusions	117

Location of Plates

Plates 1, 2, 3 and 4	between pages	21-22
“ “ 5 and 6	“ “ “ “ “	38-39

Abstract

A member of the *Eucalyptus* defoliating Australian tortoise beetles *Trachymela catenata* was recorded in New Zealand in December 1992. To date *Eucalyptus viminalis*, *E. macarthurii* and *E. macarthurii* × *botryoides* are known hosts. Investigations of a range of ecological parameters for *T. catenata* are presented in order to provide information with which to assess the potential status of this recent introduction. Life history as for all other paropsina comprises eggs, four larval instars, prepupa, pupa and adult. Adults overwinter and emerge during October to lay first generation eggs in November/December. An estimated generation time of 50 days means a second generation lays eggs during February, indicating a bivoltine life history. Females are as fecund as some other paropsines which erupt to pest levels in other countries. Larval mortality is highest during the first instar and 45.8% mortality occurred during pupation. Developmental thresholds and development times indicate that thermal requirements for completion of two generations will be met throughout most of New Zealand. Laboratory trials to determine female oviposition preference and larval performance on eight potential host eucalypts indicate *E. nitens* (an important commercial species) and *E. coccifera* to be equally as suitable hosts as those currently utilised. *Trachymela catenata* is therefore polyphagous and field monitoring of these two potential hosts is needed. The hymenopteran pteromalid egg parasitoid *Enoggera nassaui* was trialed in a study comparing parasitization of *T. catenata* eggs with those of *Paropsis charybdis*, a known host. The parasitoid had no apparent effect on *T. catenata* eggs and offers no potential control of *T. catenata* populations.

Acknowledgements

I am pleased to acknowledge Professor Brian Springett for his supervision, guidance and encouragement through all my investigations and thesis. Prof. kindled my interest in "insects on trees" with his enthusiasm for the insect fauna and the important role they play in ecosystems. I am also pleased to acknowledge Dr. Murray Potter for his supervision and guidance through the entire project, especially with data analysis. Both Prof. and Murray provided valuable constructive comment and discussion on the manuscript.

I am especially grateful to Malcolm Kay of the Forest Research Institute (FRINZ), Rotorua for his assistance and advice through the programme. Malcolm initiated the programme, willingly provided field equipment, advised with field work and data collection, provided literature and finally, provided valuable comment on the manuscript. I am also grateful to Chris Ecroyd (FRINZ) for identification of eucalypt species

I wish to thank FRINZ and the Massey University Postgraduate Research Fund for providing valuable financial assistance for the project.

I also acknowledge Mr Rodney Alexander and Mr Robert Crawshaw of Morere who kindly provided access to their properties as study sites. I especially thank Rodney and his late wife Marj for their hospitality and occasionally a bed after the long nights drive to Morere.

I particularly wish to thank Liz Grant for her excellent illustrations in this thesis, Dr. Peter McGregor of Land Care Research for valuable advice and discussion, my wife Claire, who, along with her own busy life, continues to support and encourage me to achieve my goals and my children Lorelle and Brad for assistance in the field and company on the long drives to Morere.

This thesis is for Claire, Lorelle and Brad
and my parents.

“ the field of forest entomology must in its very nature rest upon an ecological foundation”

Samuel A. Graham, 1956,

Annu. Rev. Entomol., Vol. 1.