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The Non-Target Effects of the Introduced  
Parasitoid *Trigonospila brevifacies* (Hardy)  
(Diptera:Tachinidae) on the Native Fauna of  
New Zealand.

A thesis presented in partial fulfilment of the requirements for the degree of  
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Vanessa M.W. Munro

1999

*This work is dedicated to Jock McLauchlan.*

*Difficulties encountered on a journey provide the traveller with enlightenment.  
(Tibetan proverb).*

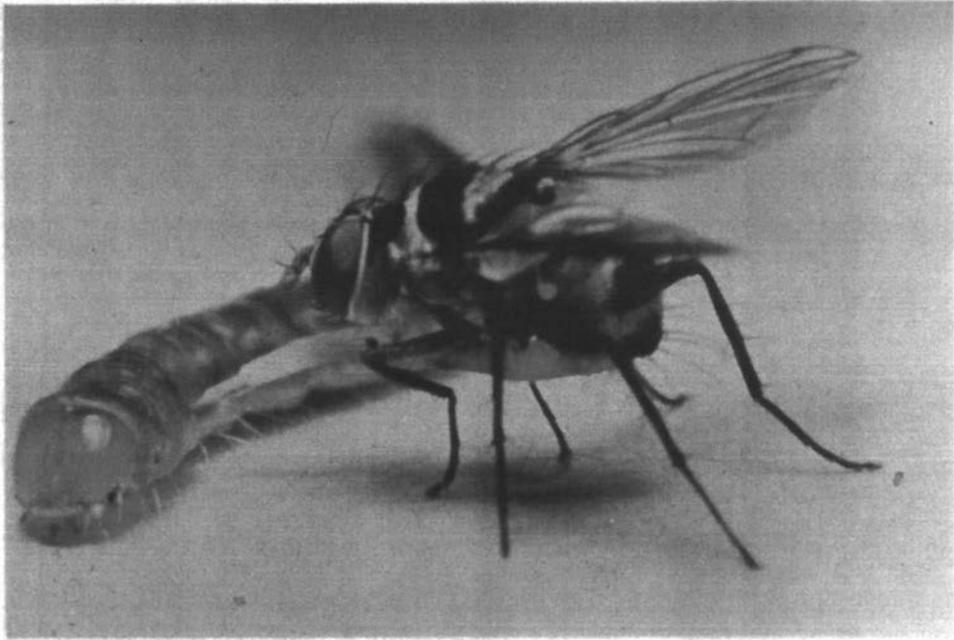


Plate 1. Female *Trigonospila brevifacies* ovipositing on a late-instar tortricid larva in the laboratory (courtesy of Hort Research Ltd.).



Plate 2. Male *Trigonospila brevifacies* in the field, one of three males observed in a lek.

## ABSTRACT

The Australian tachinid parasitoid *Trigonospila brevifacies* (Hardy) (Diptera: Tachinidae) was introduced to New Zealand 30 years ago as a biological control for the exotic orchard pest *Epiphyas postvittana* Walker (Lepidoptera: Tortricidae). *Trigonospila brevifacies*, an endoparasitoid of late-instar lepidopteran larvae, was introduced concurrently with *Xanthopimpla rhopaloceros* Krieger (Hymenoptera: Ichneumonidae), a parasitoid of lepidopteran pupae. *Trigonospila brevifacies* is now known to attack several non-target pest and non-pest lepidopteran species.

The impact of *T. brevifacies* on non-target fauna was investigated. Life history data (i.e., longevity, fecundity, productivity and sex ratio) for *T. brevifacies* were quantified in the laboratory. These data and field data were used to investigate whether superparasitism is an adaptive reproductive strategy for this species by comparing the return in adult progeny per egg for single and multiple egg clutches. Superparasitism may be advantageous for the survival of rare non-target hosts.

Data from a two-year, six-site survey of native forests determined that *T. brevifacies* attacked eight non-target Lepidoptera. The characteristic common to the phylogenetically diverse host group was that all are concealed feeders. Laboratory testing showed that pre-imaginal conditioning of parasitoid larvae did not confer adults with a preference for the host species in which they were reared.

Quantitative food web data from a two-year field survey showed that *T. brevifacies* was the numerically dominant parasitoid of the species attacking native Tortricidae at sub-canopy levels and that it competed for hosts with 12 native and one other introduced species of parasitoid.

The abundance of larval hosts and *T. brevifacies* was compared between the edges and centres of forest patches. Host density was determined by quadrat counts and parasitoid abundance by sticky traps. Both larval hosts and the parasitoid were more abundant at the forest edge. Trap hosts were also used to quantify parasitism levels along edge to forest-centre transects. Parasitism by *T. brevifacies* was highest at forest edges declining to almost zero at 30m into a forest, indicating that forest centres with continuous canopy should offer hosts' refuge from *T. brevifacies* parasitism.

Archival and field data were used to determine the present geographical ranges of *T. brevifacies* and *X. rhopaloceros* and climatic data were used to predict where else in New Zealand these two parasitoids are likely to colonise in the future.

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## TABLE OF CONTENTS.

<b>Title page</b> .....	I
<b>Dedication</b> .....	II
<b>Illustrations</b> .....	III
Plate 1. Female <i>Trigonospila brevifacies</i> ovipositing on a late-instar tortricid larva in the laboratory.	
Plate 2. Male <i>Trigonospila brevifacies</i> in the field, one of three males observed in a lek.	
<b>Abstract</b> .....	IV
<b>Acknowledgements</b> .....	V
<b>Introduction:</b> .....	1-23
<b>Biological control: perspectives on non-target impacts and future processes.</b>	
Defining biological control	1
Successful international biocontrol programmes	2
Successful biocontrol programmes in New Zealand	3
Justification for biological control use and alternatives	5
Establishment of exotic pests and benefits of biocontrol programmes to New Zealand	7
Recognition of non-target effects	8
Non-target effects	9
Routine host range testing: a procedure to reduce non-target effects	12
International requirements to test for host specificity	15
Future challenges for biological control	15
Aims of the present study	16
References	18
<b>Chapter 1:</b> .....	24-38
<b>A record of the releases and recoveries of the Australian parasitoids <i>Xanthopimpla rhopaloceros</i> Krieger (Hymenoptera: Ichneumonidae) and <i>Trigonospila brevifacies</i> (Hardy) (Diptera: Tachinidae) introduced into New Zealand for leafroller control.</b>	
Releases and redistribution	27
Records of recoveries: <i>T. brevifacies</i>	27
: <i>X. rhopaloceros</i>	29
Field and archival data	30
Colonisation of islands	31
Conclusions	31
Appendix: Recovery records for <i>T. brevifacies</i> and <i>X. rhopaloceros</i>	34

<b>Chapter 2: -----</b>	<b>39-57</b>
<b>Establishment and of the introduced Australian parasitoids <i>Xanthopimpla rhopaloceros</i> Krieger (Hymenoptera: Ichneumonidae) and <i>Trigonospila brevifacies</i> (Hardy) (Diptera: Tachinidae) within New Zealand.</b>	
Rates of dispersal	41
Present geographical range in New Zealand	42
Climate comparisons between sites of origin in Australia and sites of release and establishment in New Zealand	43
Climates suitable for future parasitoid colonisation in New Zealand	47
Dispersal	49
Climate	51
Host range and habitat	52
<b>Chapter 3: -----</b>	<b>58-75</b>
<b>The host range of the introduced Australian parasitoid <i>Trigonospila brevifacies</i> (Hardy) (Diptera: Tachinidae) in New Zealand: when, which and how non-target Lepidoptera are parasitised.</b>	
Host records	63
Effect of pre-imaginal conditioning	63
Host-plant relationships	65
Frequency of attack on host species	65
Community patterns	68
When and where does non-target parasitism occur	69
Defining the host range	70
<b>Chapter 4: -----</b>	<b>76-96</b>
<b>Identification of shared parasitism between native lepidopteran parasitoid species and the biocontrol agent <i>Trigonospila brevifacies</i> (Hardy) (Diptera: Tachinidae) in North Island forest habitats.</b>	
Community description	79
Parasitoid load	84
Quantitative web of parasitoid host overlap	88
Consideration of non-target effects by biocontrol agents on native parasitoids	90
Non-target effects of <i>Trigonospila brevifacies</i> on native parasitoids	91

**Chapter 5: -----97-120****Life history data for the Australian parasitoid *Trigonospila brevifacies* (Hardy) (Diptera: Tachinidae): is superparasitism adaptive in this species and under what conditions does it occur ?**

Life history and lifetime productivity data	103
Superparasitism in laboratory and field environments	108
Benefits of superparasitism and <i>T. brevifacies</i>	115
Direct costs of superparasitism	116
Indirect costs of superparasitism	116
Superparasitism in the field	118
Is superparasitism adaptive in <i>T. brevifacies</i> ?	117
Superparasitism and its potential consequences for biocontrol	118

**Chapter 6: -----121-136****Quantifying the distribution of the tachinid parasitoid *Trigonospila brevifacies* (Hardy) (Diptera: Tachinidae) and its larval tortricid hosts within forest patches: how invisable are native forest remnants ?**

Laboratory experiments to determine sticky trap efficiency	126
Field experiments: Host distribution within forest patches	127
Parasitoid distribution	128
Relationship between levels of parasitism and host density	129
Distribution of host Lepidoptera within forest patches	132
Distribution of adult <i>T. brevifacies</i> within forest patches	132
Location of hosts most at risk of parasitism in forest patches	133
Relationship between parasitism and host density	134

**Chapter 7: -----137-146****Existence of refuges for the non-target hosts of *Trigonospila brevifacies* (Hardy) (Diptera: Tachinidae) within forest patches.**

Risk of parasitism dependent on location of hosts in forest patches	140
Host location and the probability of parasitism	142
Factors influencing <i>T. brevifacies</i> distribution	142
<i>T. brevifacies</i> distribution and risk to native non-target species	143

**Appendices: -----147-150*****Eutorna phaulocosma* Meyrick (Lepidoptera: Oecophoridae), a new host for the introduced Australian parasitoid *Trigonospila brevifacies* (Hardy) (Diptera: Tachinidae).**