



Copyright Statement

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand). This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of this thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from their thesis.

To request permissions please use the Feedback form on our webpage.

<http://researchspace.auckland.ac.nz/feedback>

General copyright and disclaimer

In addition to the above conditions, authors give their consent for the digital copy of their work to be used subject to the conditions specified on the Library

[Thesis Consent Form](#)

THE UNIVERSITY OF AUCKLAND, 1974.

STUDIES ON DIURESIS IN THE
NEW ZEALAND EARWIG,
ANISOLABIS LITTOREA (WHITE).

by

Wayne Francis Donovan

A thesis submitted
for the degree of
Doctor of Philosophy
in Zoology.

A C K N O W L E D G E M E N T S

During the period of this study I have had cause to call on numerous people for assistance.

In particular my supervisor Dr. J.P. Leader, who not only initiated my interest in insect physiology but advised and encouraged me during all facets of this study. To him I express my sincerest gratitude.

To Mr J.G. Moorhouse, whose expertise in the field of electronics enabled me to enter a hitherto foreign domain, I extend my thanks.

My thanks also goes to Dr. J.J. Bedford for advice and assistance with the gel electrophoresis analysis and to Mr P. Hicks and Mr G. Grayston for assistance with all facets of the electronmicroscopy.

To these and many other people who made this work possible I offer my thanks.

To my wife, Cathy, who not only typed the manuscript but was a constant source of encouragement I express special thanks.

A B S T R A C T

Examination of the terminal abdominal ganglia of the New Zealand maritime earwig Anisolabis littorea (White) revealed a paraldehyde fuchsin stainable material in animals which had undergone some degree of dehydration. A Malpighian tubule bioassay preparation enabled the physiological activity of extracts of the terminal abdominal ganglia and pharmacologically active substances to be monitored.

Results obtained suggest that substances are present in the terminal abdominal ganglia which alter the Malpighian tubule secretion rate. These results are discussed in view of current theories of Malpighian tubule secretion in insects.

C O N T E N T S

Introduction	1
Materials & General Methods	14
Histology	
Introduction	17
Light Microscopy	
Materials & Methods	18
Results	20
Electron Microscopy	
Materials & Methods	22
Results	23
Discussion	25
Bioassay	
Introduction	26
Materials & Methods	
Establishment of a bioassay system	27
Determination of secretion rates	30
Results	33
Mode of Action and Partial Characterisation	
Introduction	36
Mode of Action	
Materials & Methods	
Single Malpighian tubule preparations	37
Preparation of electrodes	38
Measurement of potential difference	40
Results	
Effects of terminal abdominal ganglion extracts	42

Effects of pharmacologically active substances	44
Partial Characterisation	
Materials & Methods	
Dialysis, Heating & Gel Electrophoresis	47
Results	
Dialysis, Heated & Gel Electrophoresis	48
Discussion	50
Summary	75
References	77
Appendix	101