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**Gastrointestinal Parasites in Endemic,  
Native, and Introduced New Zealand  
Passerines with a special focus on  
Coccidia**

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

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**Ellen Renate Schoener  
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## Abstract

There is not much known about the taxonomy, prevalence, epidemiology, and life cycles of gastrointestinal parasites of passerine birds in New Zealand and there is a possibility that many of these parasites might have been introduced by non-native passerines. Approximately half of all New Zealand native passerine species are on the endangered list. Translocations to safe areas are the major management technique used to safeguard them for the future. Under natural conditions, gastrointestinal parasites seldom pose a threat. However, factors such as quarantine for translocation, overcrowding, low genetic diversity, and/or habitat changes may cause an infection outbreak that can severely affect the host species. The effect these parasites might cause under these conditions may therefore endanger translocation and captive breeding programmes. The purpose of this study was to generate baseline data on the gastrointestinal parasites of New Zealand native and introduced passerine birds with an emphasis on the coccidian parasites.

Faeces and tissues were examined from 361 birds from six native and four introduced species. Parasites were identified using flotation and microscopy, in the case of the coccidia also PCR analysis and DNA sequencing were used. Of the samples examined, 90 (24.93 %) were positive for coccidian parasites. Sequencing analysis revealed a close relationship between these parasites and other avian coccidia of the genus *Eimeria*. I found one coccidia species with a unique sequence in North Island robin and one in North Island saddlebacks, at least two different unique sequences in hihi and two in blackbird as well as at least three in tui. In addition, 18 (4.99%) birds were positive for trematodes, 30 (8.31%) for cestodes and three (0.83%) for *Capillaria*. Most of these parasites were reported during this study for the first time.

The results of this study have therefore revealed a whole range of new species of parasite infecting passerines in New Zealand providing a glimpse into the biodiversity of passerine parasites in New Zealand. This knowledge will be useful when taking management decisions particularly for translocations of protected species by alerting managers of possible sources of disease outbreak.

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## Preface

This thesis is formatted in a series of distinct research manuscripts ready for publication. Because of this, the individual chapters contain unavoidable repetition. This thesis is the original work of the author, unless otherwise stated in the references, methods and acknowledgements.

The field methods used in this study were the same as those used by Dr Isabel Castro and collaborators were studying the epidemiology of avian malaria in New Zealand passerines at the same time as I was doing this research. The laboratory methods were those of the IVABS parasitology laboratory as performed by the technicians Barbara Adlington and Anne Tunnicliffe, suggestions for flotation and parasite identification came from Dr. Bill Pomroy and Dr. Ian Scott (both IVABS), as well as from Louisa Robertson. The pathology methods and advice were provided by Dr. Maurice Alley (IVABS). The methods of DNA extraction and PCR analysis came from Laryssa Howe (IVABS) and Stephen Trewick (Allan Wilson Centre).

This thesis began as a study on Coccidia in native passerines, but after the discovery of formerly unrecorded helminths it was expanded to include these, as well as gastrointestinal parasites of some introduced birds such as blackbirds (*Turdus merula*). Some parasites have therefore been studied in more detail than others for which only limited material was available. Further study and sample collection of many of these newly identified parasites, is therefore necessary to better understand their classification and importance.

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