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**THE CANE TOAD: A NEW HOST
FOR HELMINTH PARASITES IN
AUSTRALIA**

Thesis submitted by

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Abstract

The helminth fauna of native Australian amphibians and the introduced toad, *Bufo marinus* was studied. Species composition and ecological relationships of the helminths were considered in detail. In addition, the relationship of one helminth species, *Rhabdias* sp., to the health of the toad was considered.

A total of 27 helminth species (14 Nematoda, 8 Digenea, 2 Cestoda, 2 Acanthocephala, 1 Monogenea) was collected from both the toad and native amphibians in this study. Six helminth species were found to only infect toads in this study: *Dolichosaccus juvenilis*, *Zeylanurotrema spearei*, *Cosmocerca* sp. 2, *Cosmocerca* sp. 3, *Austraplectana* sp., adult acanthocephalans. Two of these species (*D. juvenilis* and adult acanthocephalans) had been reported from native fauna in previous studies. Three species were found to infect only native amphibians in this study: *Parapolytoma* sp., *Seuratascaris numidica*, and Onchocercidae gen. sp.

All of the helminth species collected from *B. marinus* in this study, with the possible exception of *Rhabdias* sp. and *Mesocoelium* sp. for taxonomic reasons, can be determined as having an Australian origin. The majority were acquired by the toad from native amphibians. Some species, however, were thought to have transferred to the toad from native reptiles.

At least 70% of toads and native frogs were infected with at least one helminth species. Maximum number of helminth species for an individual toad was 6, whereas for native frogs it was 4.

Bufo marinus had a more diverse helminth community than native frogs at both a host individual and host population level. The use of diversity indices in helminth community ecology and the concept of core and satellite species, particularly in relation to amphibian helminth communities, is discussed.

Comparison of the helminth fauna of *B. marinus* and a native frog, *Litoria inermis*, was undertaken in detail. Relationships of total helminth intensity and species richness to various factors, including host sex and snout-vent length and month of collection were calculated for both host species. Reasons for the possible disparity between helminth infection levels for *B. marinus* and *Lit. inermis* are discussed.

Only one helminth species, *Rhabdias* sp., was thought to have potential as a biological control agent for the toad in Australia. Detailed studies of the life cycle of *Rhabdias* sp., natural infection levels within a population of *B. marinus* and its relationship with the health of the toad were undertaken.

Rhabdias sp. infected over 80% of toads collected from QDPI, with a mean intensity of 16 nematodes per infected toad. Intensity of infection had a significant relationship with length of toad for subadult toads only. Average length of *Rhabdias* sp. within an infrapopulation had a significant relationship to host length for subadult and middle size class toads.

Distribution of *Rhabdias* sp. within the toad population was aggregated, with degree of aggregation increasing with toad size class.

Sex of toad had a significant relationship with average length of *Rhabdias* sp. only in Class II toads, where male toads had larger nematodes.

Rainfall was an important environmental factor influencing infection of toads with *Rhabdias* sp. The majority of *Rhabdias* sp. recruitment into the toad population occurred during the late wet season, although small amounts of recruitment occurred throughout the year.

Development of *Rhabdias* sp. from embryonated egg to infective third stage larva, in the laboratory, took 4 days at 24°C. Development was only observed via a free-

living sexual cycle, with only one larva produced per free-living female.

Experimental infections were hampered by a high death rate among the metamorph *B. marinus* and *Limnodynastes ornatus* used. Over 50% of metamorphs exposed to infective larvae of *Rhabdias* sp. became infected. Number of larvae penetrating the metamorph was significantly related to the success of infection. Lower infection dosages produced proportionately higher levels of infection.

Haematological data for *B. marinus* in Australia is presented for the first time. Presence of a *Rhabdias* sp. infection significantly decreased levels of red blood cells, packed cell volume and haemoglobin concentration. Level of *Rhabdias* sp. infection also significantly decreased these levels, but not to the same extent as presence of *Rhabdias* sp. alone.

Declaration

I declare that this thesis is my own work and has not been submitted in any other form for another degree or diploma at any University or other institute of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

Diane P. Barton

February 1995

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Diane P. Barton

February 1995

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