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ASPECTS OF THE OSMOTIC AND WATER BALANCE  
OF THE NEW ZEALAND NATIVE FROG LEIOPELMA HOCHSTETTERI  
FITZINGER, AND THE AUSTRALIAN WHISTLING FROG LITORIA  
EWINGI DUMERIL AND BIBRON.

A thesis presented in  
fulfilment of the requirements for the degree  
of Master of Science in Zoology  
at Massey University

Murray Colin Cameron

1974

Le. hochstetteri. Location I (Tokatea Ridge),  
Coromandel Peninsula, indicating external morphology  
and similarity to rock colour. Note ridged appearance  
of skin.

Li. ewingi. Foxton Beach, indicating external mor-  
phology and colour pattern. Note smooth appearance  
of skin and digital pads.



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Li. ewingi. Foxton Beach, indicating colour pattern and digital pads. (Both frogs approximately 2x normal size.)

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ABSTRACT

Rates of dehydration and rates of water uptake when hydrated or dehydrated are described for two species of frogs of similar size from different habitats. No detectable differences in rates of water loss in frogs of both species of comparable size were noted. Considerable differences were seen in rates of water uptake. These uptake rates were lower in hydrated and dehydrated Le. hochstetteri than in hydrated Li. ewingi. Differences in rates of water uptake were reflected in measurements of skin permeability and blood plasma osmolality. Rates of water uptake in Li. ewingi were dramatically increased after dehydration, and it was proposed that this was due to hormonal mediation. The osmotic permeability of different skin regions in frogs of different species may vary in the presence or absence of oxytocin or vasopressin. This was not observed in Le. hochstetteri where the skin exhibited relatively uniform permeability, but was seen in Li. ewingi and Li. aurea. In these two species, the abdominal skin was more permeable and more readily stimulated by oxytocin or vasopressin than the dorsal skin. Oxytocin and vasopressin also increased the short circuit current (inward Na<sup>+</sup> transport) through both dorsal and ventral skin in Le. hochstetteri, but most noticeably through the ventral skin in Li. ewingi and Li. aurea. The skin was observed to be thinner in Li. ewingi than in Le. hochstetteri or Li. aurea. Thin areas in the ventral pelvic integument of Li. ewingi and Li. aurea and the presence of epidermal capillaries in these two species are thought to be of importance in water uptake. It has been suggested that water uptake mechanisms are a major factor determining the distribution of the three frog species.

### ACKNOWLEDGEMENTS

I wish to thank my supervisor Professor J. Riddle for his support, encouragement and for allowing me an essentially free hand in planning and experimentation. His suggestions on matters of style and grammar in checking the manuscript are gratefully acknowledged.

It was my privilege several years ago to hear a fascinating talk on the N.Z. Native Frogs by Mr Ian Crook, N.Z. Wildlife Service, and it was this that converted my rather armchair enthusiasm into something more positive. His subsequent efforts in obtaining permission for me to catch and keep native frogs are also deeply appreciated, as is the help that was given in the field by Mr Veitch, Fauna Conservation Officer, Auckland.

I would also like to thank Dr Ben Bell, Ecology Division, D.S.I.R. for most useful discussions on native frogs and for his invaluable advice and information on their housing and feeding.

Dr Mervyn Merrilees deserves thanks for his stimulating discussions and advice on histological matters.

The Director, Plant Physiology Division, D.S.I.R. gave permission for the use of the controlled climate room facilities at Palmerston North.

Brian Gill's knowledge of the distribution and location of Li. ewingi at Foxton Beach proved most useful and his help in collecting some of these frogs is also appreciated.

Mr John Austin, Veterinary photographer, took the frontispiece plates and the Central Photographic Unit, Massey University, developed some, and printed all of the black and white plates.

I am grateful to the Minister of Internal Affairs for permission to keep native frogs in captivity.

Mrs Margaret Aldrich, Mrs T.D. Kirby and Mrs D.W. Martin efficiently and patiently carried out all typing work.

My greatest debt I owe to my wife Barbara whose help, support and understanding made this thesis possible.