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Inviable egg production in *Theridion rufipes* (Araneae, Theridiidae): a harvest for first instar spiderlings

Thesis submitted by

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in November 1985

For the research degree of Master of Science

in the Faculty of Science of the

James Cook University of North Queensland

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"Some of the spiderlings appeared to feed on the infertile eggs in their egg mass...Further study might show that...this early nutrient (is) of value in survival patterns of a population."

Peck and Whitcomb 1970

"It would be interesting to investigate the hypothesis that sterile eggs in fertile egg sacs have been selected for as 'trophic eggs'."

Jackson 1978

Frontispiece: Prefed and prefasted first instar *Theridion rufipes* spiderlings. There are two such contrasted pairs in this photograph. x 20

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DECLARATION

I declare that this thesis is my own work and has not been submitted in any 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 Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

M F Downes

September 1985

ACKNOWLEDGEMENTS

I acknowledge the financial support of James Cook University Research Grant number 727 and have pleasure in recording my gratitude to the following people:

Valerie Davies, Curator of Arachnids at the Queensland Museum, for identification of spider specimens

Zoltan Florian of James Cook University's Optical Microscopes Unit, and the staff of the University's Photography Section, for assistance in the preparation of the plates

Phil Osmond, for making his computer available for the preparation of the text

Helene Marsh, for suffering me gladly

Rhondda Jones, my Supervisor, for making the impossible seem perfectly straightforward, and for making me believe that miracles will simply take a little longer

My family, for putting up with it

ABSTRACT

Most of the variability in fecundity and fertility in Theridion rufipes is due to differences between individual females. Food availability is the most influential extrinsic factor controlling fecundity and fertility, and the type of food consumed may also have an effect. Fecundity increases in the later egg sacs of the egg sac sequence.

Neither variations in fixed laboratory temperatures nor variations in prevailing field temperatures affect fecundity or fertility, but both development rate and oviposition intervals are markedly influenced by temperature. At a constant temperature of 20° C, development is halted and oviposition interval is greatly extended. At 25° C and 30° C, development proceeds normally and there is no significant difference in mean oviposition interval.

Some differences exist between the two relatively isolated subpopulations of T rufipes from which experimental specimens were obtained.

The eggs vary in diameter from 0.55 mm to 0.80 mm, the smaller eggs being less likely to develop. The undeveloped eggs are used as a food resource by the first instar spiderlings before they leave the egg sac and disperse. This extra nourishment enables spiderlings to survive without feeding again for up to four times as long as they can without such benefit, enhancing their survival

prospects during the dispersal and habitat-selection phase. Many spiderlings that feed on eggs prior to emergence are able to molt to second instar without further nourishment; the size increase resulting from the molt may widen the available prey spectrum.

The mean proportion of inviable eggs in an egg sac is 0.21 (s.e. = 0.01). These values indicate a marked tendency to provide an amount of extra food-egg yolk material that would approximately double the starvation resistance time during the dispersal and settlement phase. It may be impossible or less efficient to provide an appropriate equivalent amount of extra yolk in each egg at oviposition.

Egg-feeding does not occur in the postembryo stage. An account is given of postembryonic development and a proposal is made for standardization of the terms describing araneid early development stages.