Studies on the biology of the Indo-Pacific sandy shore crab, *Matuta lunaris* Forskål (Brachyura: Calappidae)

A thesis submitted by

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in December, 1985

for the research Degree of Master of Science in

the Department of Marine Biology at

James Cook University of North Queensland

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ABSTRACT

In this study, the relative growth, feeding, reproduction, absolute growth and population structure of the Indo-Pacific sandy shore crab, *Matuta lunaris* (Forskål) (Brachyura: Calappidae) were investigated, using samples collected in monthly intervals from Pallarenda beach, Townsville, Australia, between April, 1984 and May, 1985.

The relative growth patterns of 15 morphological characters were determined using direct plots, log regressions and relative proportions. Three functional units were recognized, namely, the carapace, the chela and the abdomen and its associated structures. There were no marked changes in the relative growth patterns of the carapace dimensions with size, sex or sexual maturity. However, there were variations in the growth patterns of the chela characters and those of the abdomen and its associated structures, *i.e.* the thoracic plate and the pleopods. These variations appeared to be associated with the feeding and reproduction. Those of the chela were primarily related to size during ontogeny and were discussed in relation to changes in its mechanical capabilities. Those of the abdomen, the thoracic plate and the pleopods were related to sex and sexual maturity and were discussed in relation to the differences in the specific reproductive functions of these structures.

Analysis of the stomach contents using the percent occurrence and percent point methods indicated that *M. lunaris* is a facultative scavenger and a predator of small crustaceans and molluscs. In addition, there were marked changes in the composition of its diet

during ontogeny with small individuals primarily feeding on small crustaceans such as sergestids and copepods, and large individuals primarily feeding on hermit crabs, gastropods and bivalves.

The reproductive biology was investigated using gonad indices, histological analysis of the gonads and field and laboratory observations of sexually mature individuals. Reproductive activity in terms of gamete production, mating behaviour and brood incubation was continuous throughout the year with marked asynchrony between individuals and no apparent seasonality. The mating behaviour involves a prolonged precopulatory grasping between a postpuberty male and a prepuberty female, after which the female undergoes a puberty moult and copulation occurs. Ovulation and oviposition were found to occur several weeks after copulation. Adult females were found to be capable of producing more than one egg batch from a single copulatory event with each batch containing approximately 65,000 eggs.

The absolute growth pattern was determined based on the analysis of moult increment data. Both sexes were found to exhibit a determinate growth pattern with the puberty moult being the terminal moult. However, marked differences in the growth strategies of the two sexes were found. Male absolute growth is characterized by constant but relatively small (24.7%) moult increments and an unknown and possibly variable number of instars, each with a wide size range. Female absolute growth is characterized by relatively large (41-85%) but variable moult increments, and at leas 5 distinct instars, each with restricted size ranges.

The population biology of *M. lunaris* in Pallarenda beach was assessed in terms of relative abundance, sex ratio, population structure and growth. *M. lunaris* was found to be abundant throughout the year, and although the population was dominated by large individuals (30-50 mm carapace width) most size classes were consistently present. The sex ratio remained constant at 1:1. The estimated time between settlement and maturity was approximately 119 days in males and 148 days in females.

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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 institution 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.

O.S. Perez

December, 1985

ACKNOWLEDGEMENTS

This thesis is more than just miles of text and a collection of drawings and photographs on the life history of a sandy shore crab. This thesis also bears witness to the support, guidance and encouragement of many people who have seen me through my studies.

I sincerely wish to thank my supervisor, Dr. C. G. Alexander, whose wisdom, courage and above all, good humour have been a source of strength and reassurance throughout the making of this thesis.

I would also like to thank the following people who in one way or another have shared with me their time, expertise or ideas and eased the burdens of postgraduate work:

Leigh Winsor, for his friendship and expert advise on histological procedures;

Prof. R. E. Jones, Prof. A. McLachlan, Dr. P. Arnold and Dr. J. Lucas for helpful discussions and advice on various aspects of this thesis;

the technical staff of the School of Biological Sciences for maintaining their cheerful dispositions despite my seemingly endless requests for vehicle bookings, equipment etc.

the staff of the James Cook University Computer Centre and the Typesetting and Photocopying sections for their patience and skillful service, without which this thesis would not be possible;

Dirk Zeller and Dr. I. Price for kindly translating some papers;

Louella Dolar and other friends for their invaluable help in the field;

my colleagues in the department for stimulating discussions and distractions;

the Crustacean Department of the Australian Museum for permission to examine their *Matuta* collections and for helpful advice,

and Dr. Angel C. Alcala, my mentor, for his keen interest in my work and enthusiastic support throughout my studies.

I am indebted to the International Development Program of Australian Universities and Colleges (IDP) and to Silliman University through its former President, Dr. Quintin S. Doromal, for granting me the scholarship and permission to study in Australia.

Finally, I wish to thank two special people whose steadfast support and unfaltering encouragement has enabled me to get this far:

David Roy Bellwood, slave driver, tireless crab catcher, critic and friend, for his invaluable assistance throughout the preparation of this thesis

and Mrs. Ludy S. Perez, my mother, for her love and understanding, though distant, but nevertheless, unfailing.