Growth and reproduction are central to the biology of any species and an understanding of these two processes is vital for the management of animal resources. Since both these are largely energy-expending processes, of late, a lot of emphasis has been laid on estimation of cost of growth and reproduction in crustaceans (Calow, 1977; Vernberg, 1987). Crustaceans are largely comparable to insects in their adaptive diversity and economic usefulness. However, to date, far less is known about crustacean reproduction than the reproduction of insects (Adiyodi and Subramoniam, 1983). In recent times, a need for mastery over controlled breeding of crustacean species, has become imperative in order to improve aquaculture prospects. Since reproductive adaptations are in accordance with the varying life styles of each species, it would be incorrect to draw generalizations on reproductive processes of any group of animals, based on studies of a few species. This is all the more true for a group like crustaceans where, there are subtle species- variations between somatic growth and reproductive phenomenon (Adiyodi and Adiyodi, 1970; Adiyodi, 1985). It is here that the two phenomena-
moulting and reproduction are synchronized in species-specific unique manner, rendering generalizations highly problematic. Therefore, it is essential that each species be treated as a separate example for indepth studies on moulting as well as reproduction.

The tropical rice land freshwater prawn Macrobrachium lanchesteri (de Man), is a species of Malaysian origin (Johnson, 1969), but one, which has very well adapted to the edaphic features of the Indian sub-continent. Considerable biological information on this species, inhabiting local lentic systems, has been documented, largely pertaining to its occurrence and distribution (Anantha Raman et al., 1986), Physiological energetics of food conversion (Ponnuchamy et al., 1988) and neuroendocrine control of reproduction (Rao et al., 1988). Since the species is one of the largest of the caridean prawns of Bangalore, its potential as a candidate species for aquaculture programmes has been repeatedly stressed (Ponnuchamy 1981; Anantha Raman, 1982; Rao,1983). However, since details of its reproductive processes in relation to moulting are not thoroughly known, attempts at manipulation of its controlled breeding have not been very successful. That the species can be satisfactorily grown in captivity from zoeal to the adult stage, has been recently projected by Manjunath
(1989). In the light of the above studies, the present work on the reproductive biology, histomorphology of oogenesis and oocyte maturation of *M. lanchesteri* have been undertaken to gather the requisite information on the reproductive process of the female of the species, before experimental manipulation could be attempted/suggested.

Since reproduction is intricately related to moulting in crustaceans and any comparable event of reproduction must necessarily be referred in relation to the stage of moulting, an initial study on the moult staging of *M. lanchesteri* has been undertaken. With this background information on the different stages and duration of moulting and review of the neuroendocrine control of the moult process in the species, a long-term study on the annual reproductive cycle of the species has been carried out in a local population of the prawns. The annual pattern of reproduction has also been correlated with the major environmental factors operative in nature. On reviewing the neuroendocrine control of reproduction in the species, further investigations have been restricted to the observations on the females only. Extensive information has been gathered on the process and events leading to the maturation of the ovaries in this prawn. The studies include classification of the ovarian maturity stages based on colour, morphology, ovarian
index, gonadosomatic index and oocyte diameter frequency distributions. Further, using light microscopic studies, the process of oogenesis in the species has been investigated through observations on characteristic changes in oocyte cytoarchitecture through oogenesis and vitellogenesis. An attempt has also been made to determine the sequence in which the yolk substances are synthesized (or sequestered) by the oocytes, through some histochemical and biochemical techniques.

ARRANGEMENT OF CONTENTS

The textual matter of the thesis has been arranged as follows:

After this General Introduction (chapter 1), in chapter 2, descriptions of the material used and the different methodologies adopted have been detailed. In the subsequent five chapters, each including an introduction followed by results and discussion, new information on the moulting, reproductive cycle and ovarian maturity of *M. lanchesteri* have been described. The observations on the moult staging/duration of *M. lanchesteri* presented in chapter 3 are followed by the population studies on the reproductive cycle of the species (chapter 4). Studies on the gross morphology of the ovaries and oocyte diameter frequencies are
included in chapter 5. Chapter 6, presents the histological observations on the ovaries of *M. lanchesteri*, in which the oocyte growth through different stages of oogenesis and vitellogenesis has been traced. These six chapters are concluded by a general discussion (chapter 7), followed by a summary and a compilation of the literature cited. Finally, an appendix has been included, listing the research publications of the author.