Man in his quest to explore food had turned towards the oceans and during the last five decades, there has been phenomenal increase in the exploitation of the marine fisheries resources. According to FAO statistics (1983), marine fish landings of the world stagnated at about 73 million tonnes per year during the last decade. It is generally believed that harvest of fisheries resources from the oceans is either at or near the maximum sustainable yield (Lawrence, 1981); whereas the demand for marine fish and fishery products is on the increase.

Crustaceans, as a group, contribute significantly to the marine fish landings (about 15% of the total), with the shrimps and prawns constituting bulk of the catch (about 97.3%). The landings of shrimps and prawns had been increasing steadily since 1960. In 1982, a production of 1.69 million tonnes was recorded, which was about 71% higher than the production of 1.2 million tonnes recorded during 1972. During the last five years, the world production stayed at an average between 1.6 and 1.7 million tonnes.

Among the top 20 countries, producing 83% of world catch of shrimps and prawns, India holds the premier place, with a production of about 214,980 tonnes during 1983 (FAO, 1983). However, prawn catches have remained steady during the
years from 1974 to 1984, with production fluctuating between 164.2 and 250.3 thousand tonnes. This has generated considerable concern among fisheries researchers, planners and development personnel, who have started looking for new avenues to meet the ever-increasing demand for prawns and prawn products. Culture of prawns in coastal saline water impoundments appears to be a promising avenue.

The success of any aquaculture production system depends upon the sum total interaction of all abiotic and biotic factors which directly or indirectly influence production. These interrelated parameters have also marked influence on the success of prawn culture operation. Many of the problems associated with aquaculture production can be coped up through manipulation of nutrients in feed formulations, taking in view the cost of production of feed and animal biomass per unit area.

In most of the cultivated species certain amount of food is obtained from the natural environment, yet, in high density culture systems, supplementary feeding becomes inevitable for better farm production. This can be in the form of natural diets or may be in the form of compounded diets obtained from different natural ingredient sources of both animal and plant origin. Compounded diets also referred to as artificial diets are either complete (containing all the required nutrients in adequate levels) or supplemental (meant to provide additional energy rich ingredients) to animals receiving some natural food. However, inspite of several years of research in this field,
majority of the formulations proved rather unsatisfactory, when compared to live or natural feeds for the production of juveniles for stocking purposes. This is mainly due to imbalance of essential nutrients in these empirically formulated feeds.

Thus, it is clear that knowledge of the nutritional requirements of the cultured species is a prerequisite for the formulation of practical feeds. However, the study of prawn nutrition is complicated by multivariate factors with imposing dimensions. Goodwin and Hanson (1975) consider 11 major variables, namely, stage of growth, species of shrimp, water quality and temperature, feed stability (binding), presentation, percentage and derivation of protein, health of shrimps, effect of feeds which occur naturally in the rearing environment and feeding rates which synergistically affect the overall production rate of prawns.

The Indian white prawn, *Penaeus indicus* H. Milne Edwards, is one of the most suitable cultivated species. Extensive studies have been made in the past on the biology, fishery, life-history and culture techniques of the species. However, only very few studies have been carried out on the nutritional requirements of this species, though a number of studies have been carried out on the efficacy of a variety of compounded feeds. Besides, the vitamin requirements of prawns in general and penaeid prawns in particular have been very poorly understood, inspite of their importance in the metabolism.
Therefore, nutritional studies were carried out in the juveniles of the Indian white prawn, *P. indicus* H. Milne Edwards with the following objectives:

- to study the effect of different levels of proteins in purified diets on the growth, feed efficiency and body composition and to determine the optimal protein requirements of juveniles.

- to evaluate the nutritive value of cheaply available protein rich ingredient sources (plant and animal origin) in diets.

- to study the deficiency symptoms associated with the deletion of water-soluble vitamins (ascorbic acid, choline, thiamine, pyridoxine, niacin, pantothenic acid, riboflavin and inositol) from the diet.

- to study the dietary requirements of important water-soluble vitamins (ascorbic acid, choline, thiamine, pyridoxine, niacin and pantothenic acid) using graded levels of the test vitamin in purified diets.

The thesis has been organised into nine chapters. Chapter I deals with the protein requirement using purified diet with casein as protein source. Chapter II relates to the nutritive value of cheaply available protein sources, which can form alternative protein sources for large-scale feed production for *P. indicus*. Chapter III deals with the effects
of deletion of some of the water-soluble vitamins from the diets. Chapter IV to IX deals with the quantitative vitamin requirements of the prawn for ascorbic acid, choline, thiamine, pyridoxine, niacin and pantothenic acid.

All the experiments were carried out in the laboratory and the following parameters were studied: survival, growth, specific food consumption, food conversion ratio, protein efficiency ratio and body chemical composition. In addition to these, ammonia excretion rates by prawns were recorded in few experiments. Also, histological studies were carried out in prawns from ascorbic acid and choline requirement experiments, to study the effect of these vitamins on the cellular structures. All the data obtained were statistically analysed and represented in the graphs.

The present investigation shows that the juvenile prawns have a protein requirement between 35 and 40% in the diets. Amongst the tested protein sources, both of plant and animal origin, it appears that animal protein sources, in general, and a mixture of animal protein sources in particular have significant effect on growth. However, plant protein sources like soybean meal and groundnut oil-cake too can form alternative protein sources in mixed diet formulations.

The vitamin requirement studies show that amongst water-soluble vitamins—ascorbic acid, choline, thiamine,
pyridoxine, niacin and pantothenic acid are indispensable. In most of the studies, the survival and growth were affected significantly when the prawns were fed without these vitamins. Partial molting, changes in the cellular structures of musculature and hepatopancreas, blackening of gills, and significant alterations in behaviour and food intake are some of the major deficiency symptoms recorded during the study. Supraoptimal dosages resulted in poor growth and survival, besides alterations in biochemical composition of carcass, behaviour and efficiency of utilization of food and protein. All these results and observations suggest that juvenile *P. indicus* require vitamins in diets at optimal levels.

Thus, the present investigation in juveniles of *P. indicus* clearly outlines the dietary requirement of protein and some of the vitamins which significantly influence the growth and survival. The recommended dietary nutrient levels are near optimal levels required by the species under similar experimental conditions. However, the requirement for nutrients can be significantly altered by a variety of endogenous and exogenous factors which affect metabolism of prawn and needs extensive further study. However, the present study is the first attempt on the vitamin requirements of the prawn *P. indicus* and the optimum levels suggested would help formulate practical diets for large-scale culture of the species, thereby minimizing wastage of nutrients.