LABORATORY REARING OF LARVAE OF THE PALAEMONID SHRIMP
MACROBRACHIUM ACANTHURUS (WIEGMANN, 1836)

BY

P. C. CHOUDHURY
Zoology Department, University of the West Indies, Kingston, Jamaica

INTRODUCTION

Macrobrachium acanthurus is a palaemonid shrimp which lives in brackish and fresh waters. It is known to occur in the eastern part of America, from Georgia (U.S.A.) to southern Brazil, and the West Indies (Holthuis, 1952). In Jamaica this species is found in fresh and brackish waters at low altitudes. Little work has been done on artificial rearing of larvae, juveniles and adults of the shrimps belonging to the genus Macrobrachium. Choudhury (1971) has described the complete larval development of M. carcinus (L.), the largest species of this genus in the Western Hemisphere. In another paper (1971a) I have reported on responses of larval Macrobrachium carcinus to variations in salinity and diet. Ling (1962) has described methods for artificial rearing of larvae and juveniles and culturing of adults of M. rosenbergii (De Man) in Malaysia. Ingle & Eldred (1960) have reported on the possibilities of artificial cultivation of M. acanthurus. They have also reported that Percy Viosca in Louisiana and Earl Register in Florida attempted to raise hatchlings of M. acanthurus but were unable to get any survival after about a week to ten days. Choudhury (1970) has successfully reared the larvae of M. acanthurus through all stages to juveniles and has described the morphology of the larval stages. The purpose of the present study is to (1) report on observations on mating, spawning, and incubation, and on hatching and general biology of the larvae; (2) describe the methods of artificial rearing of larvae and (3) present results obtained from rearing experiments.

REARING OF LARVAL STAGES

Materials and methods

Berried females were collected from the Cabarita River, in the Parish of Westmoreland, Jamaica. The animals were transported to Kingston in large plastic containers provided with strong constant aeration. Ten to twelve berried females were kept in each aquarium (40 cm × 30 cm × 30 cm) containing fresh water with aeration from an air compressor. The animals were fed with ground fish, boiled rice, vegetables and corn. Unused food material and faecal matter were siphoned out twice daily. Hatching always took place during the early hours of
night. The newly hatched larvae were induced to concentrate at one corner of the aquarium by shading the rest of it with black paper. The larvae were then siphoned out and were kept overnight in clean fresh water.

For rearing experiments the larvae were slowly acclimatized to experimental salinities. The larvae were placed in glass beakers containing a measured volume of fresh water and then a calculated volume of sea water was added slowly over a period of four to six hours to bring the salinities to the desired levels. These larvae were then transferred to glass containers containing 600 ml of water at experimental salinities corresponding approximately to those in the beakers. A large number of larvae were mass reared in aquaria (40 cm × 30 cm × 30 cm). All larvae were under constant aeration.

The larvae were fed on newly hatched nauplii of brine shrimps, detritus and prepared food from flesh of fish, crustacean muscles (shrimps and crabs) and vegetables like beans, carrots, cabbages etc. Eggs of brine shrimps were hatched in sea water in separate dishes. The newly hatched nauplii were pipetted out and were given to the shrimp larvae twice daily. Fresh flesh of fish was chopped finely and then washed with several changes of water to remove all soluble matters. The ground fish was then made into small fish balls which were stored in the deep freeze compartment of a refrigerator. When frozen solid the fish balls were rubbed hard against the stainless steel mesh of strainers of different mesh sizes as suggested by Ling (1962). The fine fish particles thus produced were put in clean water and stirred so that the fish particles became freely suspended in the water. A centripetal force was then applied in the water by using a glass rod. As a result, all the suspended fish particles were brought together in the middle of the container with the bigger and heavier particles in the centre surrounded by smaller particles, the smaller the particles the further they were away from the centre. Layers of fish particles of different sizes (table I) were then separated with the help of a medicine dropper and were stored in a deep freezer until needed. Muscles of shrimps and crabs were boiled and then passed through strainers and the food particles were graded as described before. Vegetarian diet was prepared by boiling vegetables such as carrots, beans, cabbages etc. for ten to fifteen minutes and the soft pieces were passed through strainers and graded as before. Detritus was collected from the mouth of the Wag Water River, in the Parish of St. Mary. The salinity of the area varied from 100/00 to 200/00.

The shrimp larvae were fed with prepared food three times a day and once at night. To feed, the larvae were induced to concentrate at one corner of the container and a drop of food particles was then gently spread on the surface of the water with a small medicine dropper. The larvae were observed to catch food particles and swim away. This process was repeated at intervals of 2 minutes until all the larvae were found carrying food. Aeration was stopped during feeding with prepared food.

All the containers were checked daily for dead larvae and exuviae. Daily each larva was examined separately in a watch glass under a dissecting microscope and