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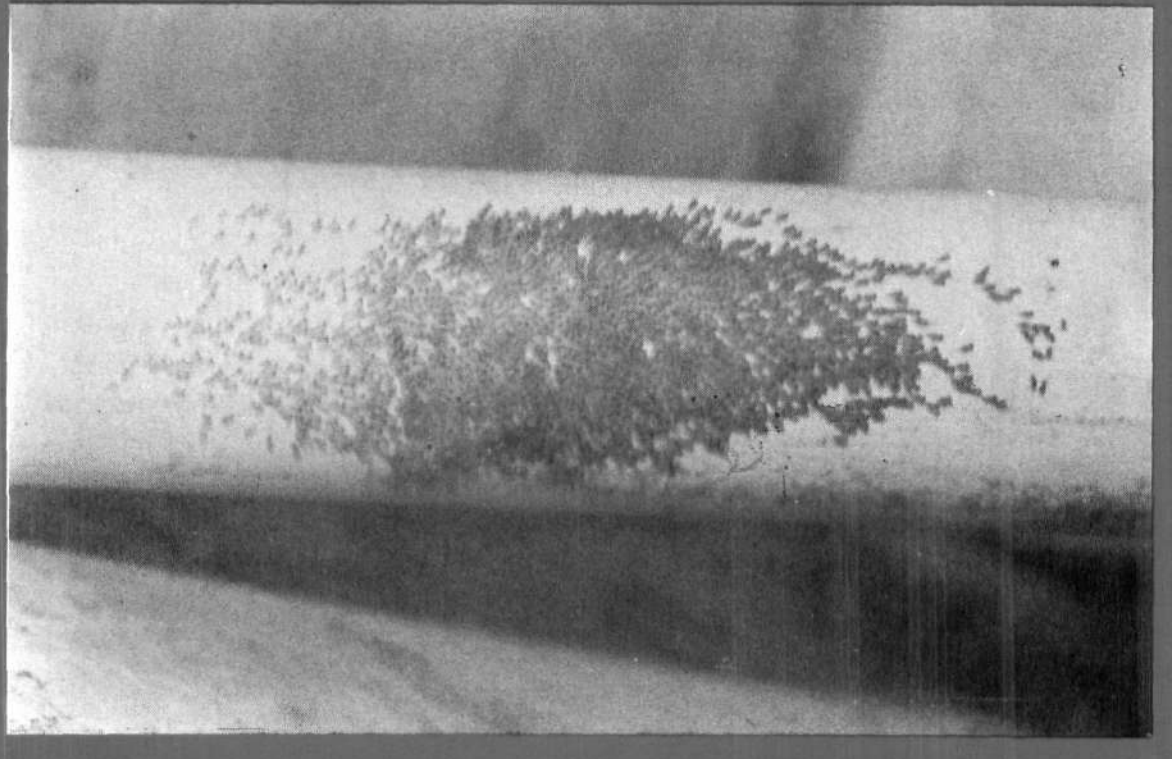

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906 BREEDING AND LARVAL REARING OF THE CLOWNFISH *AMPHIPRION CHRYSOGASTER*

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Introduction

The marine aquarium fish trade is rapidly expanding and there is an increasing demand for tropical marine aquarium fishes in the international market. Eventhough India has a vast resource potential of marine ornamental fishes we have not yet ventured into this lucrative international market. It is well known that the marine ornamental fishes are mostly associated with the coral seas. The indiscriminate exploitation of these areas can cause severe damage to the delicate coral reef ecosystem. In this context, captive breeding and rearing of marine ornamental fishes can open up a new avenue which can lead to the supply of marine ornamental fishes from hatcheries. At present there has been only a few developments in the breeding and rearing of marine fishes but it has gained momentum in aquaculturally developed countries and improved technologies are emerging in this direction.

The clownfishes

The pomacentrid fishes belonging to the genera *Amphiprion* and *Premnas* are extremely beautiful tropical marine aquarium fishes suited for aquariculture and are in great demand in the international market. These fishes, popularly known as clownfishes or anemonefishes are distributed in the tropical and subtropical seas. The popularity of clownfish among the aquarists all over the world is due to the generally small and hardy nature of the fish, their attractive colours, high adaptability to life in captivity and the interesting display of behaviour due to their association with sea anemones. The clownfish form pairs and display territorial behaviour by driving away other fish which venture close to their nest. They may spawn year round and the reproductive pattern is unusual. They all begin as males. Then the largest, most dominant fish becomes a female and the next dominant fish becomes her mate. If the female dies, the mate becomes a female and select the next male down the line. One mated pair grows ahead of others and by chemical means suppresses their growth. A technology for breeding and rearing of the clownfish *Amphiprion chrysogaster* was developed at Vizhinjam Research Centre of Central Marine Fisheries Research Institute.

Broodstock development

The fishes along with the anemones were collected from Tuticorin/Mandapam and kept in one tonne tanks fitted with biological filter. In each tank 4-6 numbers of fishes of different sizes were introduced. They were fed with minced beef and boiled mussel meat two times

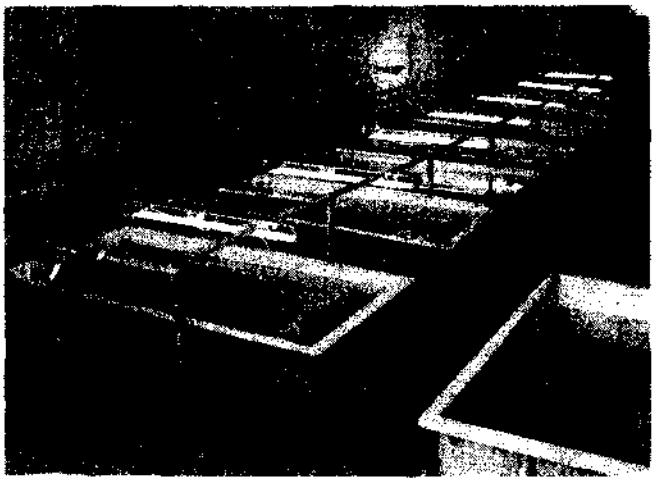


Fig. 1. Broodstock development of clownfish.

daily. In all the tanks one pair grew ahead of others and became the spawning pair. The size of the mature fish was between 8-9 cm. Sexual dichromatism was noted in the spawning pair. The snout of the male was dusky yellow whereas that of the female was bright yellow.

Spawning

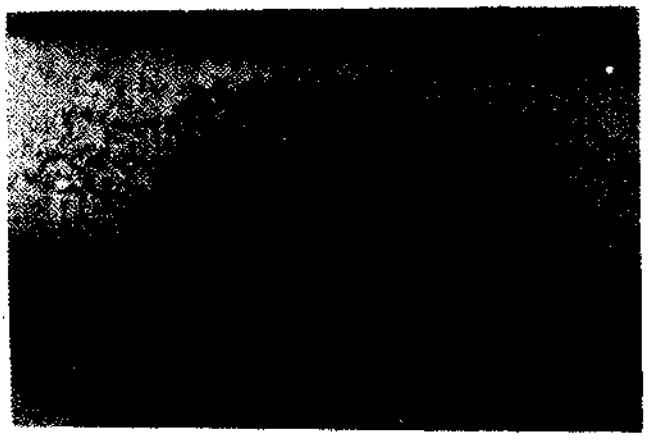
The fish spawned several times in the broodstock tanks. The spawning pair drove out other fishes intruding into their territory. Spawning started with the cleaning of the substratum at which eggs are to be laid. Then the egg laying started which lasted for about an hour. The spawning always took place during 0900 to 1400 hrs. The eggs were attached to small earthern pots, granite stones, on the sides of the broodstock tanks and even to the PVC pipes of the biological filter of the tank. The number of eggs at a single spawning ranged from 300 to 800. The interval between successive spawning of a pair varied between 10 days to 45 days. Both the parents guarded the eggs and fanned the eggs with their fins and mouth.

The freshly laid fertilised egg was orange in colour and it started swelling within a few hours. The eggs were stalked, capsule shaped and the length ranged from 1.7 to 2.9 mm. A bright silvery spot inside the egg was obvious through the egg capsule. The unfertilised eggs were more orange in colour and remained thin.

Hatching the eggs

After spawning was completed the eggs were carefully removed without exposing them to air and placed in the hatching tank. The hatching tank (100 litre capacity) had filtered sea water from a biological filter and some quantity of water from the parental tank. The eggs required continuous aeration which was created by the fanning of the eggs by the parents. The eggs started darkening from the second day and the developing larvae were clearly visible through the egg capsule from the third to fourth day. The larval hatching period was between six and seven days. On the day of hatching the egg capsules became very thin and transparent. Glowing of the larval eyes

Fig. 2. Laying of eggs on granite.



Feg. 3. Freshly laid eggs attached to PVC pipe.

Feg. 4. The male moves the eggs laid on earthen pot, by mouth.

was prominent. The larvae broke the capsules and came out. Darkness accelerated hatching. Mass hatching of the eggs occurred during night with the peak during 1900 to 2200 hrs. In most cases 60-90 % of the viable eggs hatched on the same night. But in a few cases half of the eggs were found to hatch in the following night. Better results were obtained by keeping the eggs in the parental tank itself till the eggs became transparent. The male continued to fan the eggs periodically and decaying of the eggs was much reduced. The eggs were transferred to hatching tanks on the previous day of expected hatching. More than 90 % hatching was noted by this method. The viability of the eggs was highly variable. The non-viable eggs became white-from the third day of incubation.

Larval rearing

When the larval hatching was complete the aeration in the tank was completely stopped. It prevented damage caused by water current due to thrashing of the larvae to the sides of the tank. Then the substratum on which the eggs were attached and the debris of the eggs were removed. The larvae were transferred to the larval rearing tanks. Larval removal was done very carefully by siphoning them out or transferring them into small buckets along with water.

The larval rearing tanks (100 to 200 li-

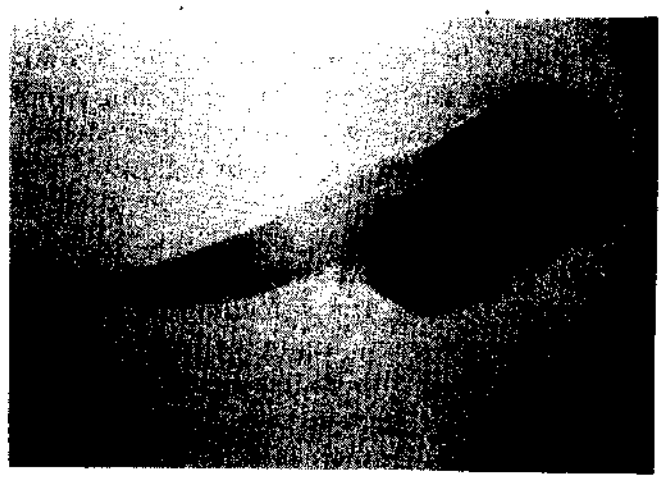


Fig. 6. Microscopic view of the newly hatched larva.

Fig. 7. The filtration system developed for larval rearing.

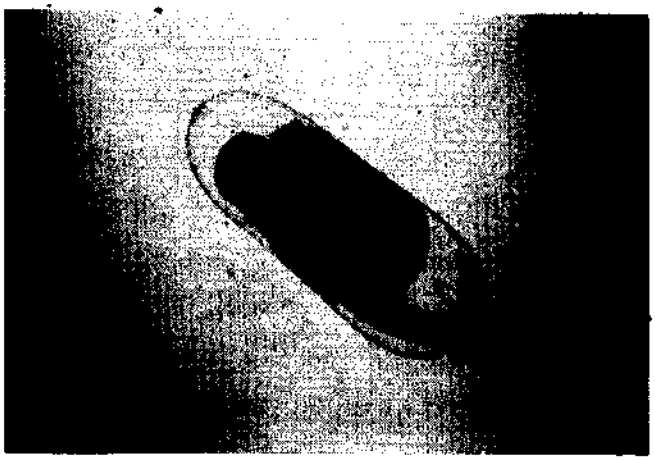


Fig. 5. Microscopic view of the larva growing inside the egg capsule.

Fig. 8. The young ones introduced to growout tanks with sea anemones.

tres capacity) were fabricated with special type of filtration system. The water from an overhead tank with biological filter was recirculated through the larval rearing tanks. The water circulation in the larval rearing tanks was made through fine pores put at the bottom of the PVC pipes which were placed inside the rearing tanks. The filtration rate was adjusted around 100 % per hour.

The length of the newly hatched larvae ranged from 2.5 to 3 mm (mouth gape varied from 200 to 250 µm). The larvae were found actively swimming in the water column. They had only little quantity of yolk and started feeding the following morning after hatching. The larvae were fed with the rotifer *Brachionus rotundiformis* cultured by outdoor culture method. The average lorica length of *B. rotundiformis* fed was 150 µm. The rotifer should be thoroughly washed in filtered sea water before feeding. The larvae were fed at the rate of 6-8 numbers per ml of the rotifer for the first four days. The larval survival during the critical period (from the day of hatching to the fifth day) ranged from 50 to 60%. From the fifth day onward they were fed with a mixture of *B. rotundiformis* and freshly hatched *Artemia* nauplii. Contamination with unhatched *Artemia* cysts was detrimental to larval survival. When this factor was checked there was no further mortality of the larvae. The larvae metamorphosed into juveniles between days 12 and 15 from the day of hatching. The average length of just metamorphosed young one was 8 mm. The young ones were transferred to growout tanks with sea anemones.

Conclusion

The major technological aspects of clownfish rearing programme are the successful development of broodstock, methods of hatching the eggs, development of a biological detoxifying filtration system for larval rearing and appropriate larval feeding schedule. All these hurdles are successfully overcome now and by upscaling the present technology large scale hatchery production of clownfish young ones for domestic as well as export market could be achieved.

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