Successful Breeding of Common Clown Fish *Amphiprion percula* under Captive Conditions in Andaman and Nicobar Islands

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Anemone fishes (belonging to the family Pomacentridae, sub family Amphiprioninae) comprising genera *Amphiprion* and *Premnas* are commonly known as clown fishes, and are one of the most popular attractions in the international marine aquarium fish trade. Out of the 28 species of these anemone fishes reported from the different geographical areas of world oceans (Allen, 1972), Andaman and Nicobar Islands are endowed with 15 of them (Madhu and Madhu, 2000). Most of the anemone fishes are colourful, peaceful, hardy, and easy to feed. They are well known for their ecological relationship with sea anemones. Among the anemone fishes *Amphiprion percula*, the common clown fish, is the most colourful, ranking first among the different anemone fishes in the aquarium trade. There are a few reports which say that this species has been bred in captive conditions in Philippines (Alava and Gomes, 1989) and Australia (Job *et al.*, 1997).

Singapore, USA, Europe, Japan, Malaysia, Philippines, Taiwan and Indonesia command a big market in the aquarium fish trade but India's contribution in this line is negligible even though Indian seas particularly the waters around Andaman and Nicobar Islands and Lakshadweep islands, are endowed with good resources of many lucrative ornamental fishes. Out of 200 varieties of marine ornamental fishes occuring in Indian waters, more than 50 varieties, because of their attractive features, are found to be export-oriented. However, stocks of these fishes have been in a declining stage in certain locations around these islands due to over exploitation. This situation calls for in-depth investigations on the development of technology for accelerating the domesticated production of marine ornamental fishes. Such investigations will ultimately boost our export trade, while at the same time enabling the protection of natural populations of these species. In this background, the authors succeeded in breeding *A. pericula*, the common clown fish and a report on this, the first of its kind, is presented hereunder.

Broodstock development

The major technological hurdles in the breeding of *A. percula*, the common clown fish (An anemone fish) is the selection of suitable breeding pairs. As these fishes are protandric hermaphrodites, selection of an active adult male for the breeding programme is of vital importance. Accordingly, different size groups of the fish have been collected from reefs of North Bay of Andaman islands during August 2001 and eight fishes out of the various size groups were introduced and reared along with the sea anemone *Hetractis magnifica* in a 500 litre FRP tank with nutritiously adequate food two times per day. After a rearing period of 90-10 days, it was noticed that one pair grew ahead of others and they were identified as a spawning pair. This pair was transferred into a 100 lit capacity glass aquarium which was used as a breeding tank. The pair was induced to breed in this tank. Similar pairs, subsequently identified, were also transferred into separate aquaria (breeding tanks). The temperature in all the breeding tanks is maintained between 25 to 27° C and the water is recirculated to ensure high levels of dissolved oxygen, with the aid of a specially devised filter system. Suitable environmental conditions have been provided and the broodstock was fed with a mixture of high cholesterol foods such as mussel meat and shrimp, and on formulated feeds enriched with vitamins, minerals and algal powder, in order to improve egg quality and colour.

Spawning

After a period of 120-150 days of captive growth, the first pair spawned on January 10, 2002. The fish bred between 0600 hrs to 0900 hrs and 1300 hrs to 1700 hrs. Capsule shaped eggs were deposited on the sides of the breeding tank 10 times, within a period of 120 days in nearly round patches. The eggs ranged between 1.9 mm to 2.8 mm in length and 0.8 to 1.0 mm in width. They adhered to the sides of tank with stalk. The newly spawned eggs were light orange in colour on the first day of spawning but they turned to bright orange on the second day. Subsequently, on the third day, as the embryo developed, these turned black. The eggs became still darker from fourth to sixth day of incubation and the eyes of the developing larvae inside the egg capsule were clearly visible when viewed from a short distance. On the seventh day of incubation the eggs became silvery and the glowing of eyes of larva inside the egg was clearly visible. In fact, hatching took place on this day.

Parental Care

During incubation period, both the parents assiduously looked after the eggs (Fig. 1), by way of fanning and mouthing as reported in the case of *A. chrysopterus* (Allen, 1972). Fanning was achieved by fluttering the pectoral fins and this appears to have helped in reducing the mortality of eggs. The parents removed the dead or weakened eggs and dust particles on other eggs through mouthing. Males assumed nearly all responsibility of caring for the eggs and spent a higher percentage of time at the nest than the females did. This process increased gradually as the day of hatching approached. On the final evening when hatching took place, males spent most of their time in fanning and mouthing. The female spent a relatively less time at the nest throughout the incubation period.

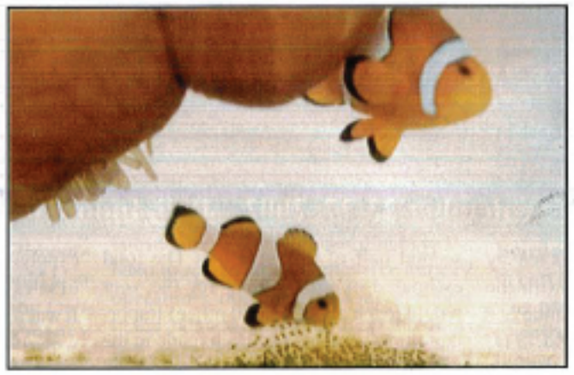

Fig 1. Pair of *A. percula* : male is fanning and mouthing the eggs

Hatching and Larval Rearing

The hatchlings pierced through the egg capsule and emerged tail first on the seventh day of incubation. The first hatchling came out immediately after the sun set (1830 hrs) and the peak emergence of hatchlings took place between 1900 to 2200 hrs under darkness. The hatchlings as they came out of eggs measured 3 to 5 mm in length each. They had a transparent body, large eyes and a small yolk sac. The hatchlings remained at the bottom of the tank for a few seconds, and soon after, they started to swim freely. As the newly hatched larvae had only little quantity of yolk, they started feeding on the following morning. The larvae were initially fed with the small rotifer *Brachionus rotundiformis* up to the fifth day. From the fifth day onwards the larvae were given a diet of newly hatched Artemia nauplii along with the rotifer. In order to improve the water quality as well as the composition of the feed, a mixed culture of micro algae was added to the tank. The first sign of normal colouration appeared in the larvae on eigth and ninth day of hatching. On days 15 to 17, most of the larvae grew to a length of around 8 mm. At this stage the larvae began to shift from partially pelagic to epibenthic habitat and started eating minced shrimp, fish flesh, mussel meat, clam meat and formulated diets.

During larval rearing it was found that the period from the day of hatching to 5th day was very critical and risks of mortality were high. An in-built filter system had been developed which esnsured recirculation of the water and exchange of water without agitation of the water column in the tank. Since the larvae were very delicate, provision of gentle aeration through air stones was found impractical as the movement of air stones during water recirculation was harming the larvae. Survivability was more when there was no noticeable movement of water. There was another critical problem encountered during the larval rearing which was the "head butting syndrome" a phenomenon in which the larvae would swim towards any light reflected off to the sides or bottom of the tank and would continue to hit on the sides of the tank until they eventually died. In order to reduce this behaviour, measures were taken to prevent light reflection from the sides and bottom of the tanks. Diffused light intensity was another critical factor faced not only during day but also at night. To counteract this, a low intensity diffused light was provided, suspended well above the tank during the night which helped to keep the larvae swimming towards the water column rather than sinking to the bottom. This innovation ensured visibility of the larvae to locate their food.

Conclusion

The experience gained in breeding aspects of clown fish (*A. percula*) (Spawning behaviour and parental care), egg morphology and embryological development during incubation period, hatching, larval morphology, larval behaviour, settlement and colour pattern development could be useful to develop suitable techniques for breeding other marine ornamental fishes and their seed production. Reef fishes can serve as alternative culture species in commercial shell and finfish hatcheries. The fragile ecosystem of Andaman and Nicobar Islands has the unique distinction of having several varieties of *Amphiprion* species which makes this area an important site for undertaking intensified induced breeding programme of these species. More over release of the hatchery produced seeds in to the sea as part of a ranching programme will also help to sustain their population in the sea ground islands where depletion of the stocks has been noticed due to over exploitation and habitat destruction. Sea ranching with the seed of the species is of vital importance as there is a great potential for the production of tropical marine aquarium fishes in these islands.

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