

## **Larval development and embryonic study on *Colisa fasciatus* : A potential indigenous ornamental fish of North-East India**

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### **ABSTRACT**

*Colisa fasciatus* is a very important indigenous ornamental group of anabantids available in the water bodies of North-East India. In the present trial, partial water exchange and bath treatment of salt solution for 1 minute induced breeding of *C. fasciatus*. Different larval developmental stages of *C. fasciatus* from day 1 to day 30 have been recorded. 18-20 days old larvae showed frequent surfacing, first sign of aerial breathing. These anabantids have good potential in domestic and international market due to their beautiful coloration. Thus, to conserve them, mass production techniques should be disseminated among the ornamental fish breeders and which will generate employment opportunities to the unemployed rural youths and thereby earning a substantial amount of foreign exchange to ensure their livelihood.

**Key words:** Anabantids, breeding, larval development, conservation

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### **INTRODUCTION**

Anabantids are classified as labyrinth fish and are distantly related to Cichlids and Perch. All Anabantids originate from Southern Asia and Africa. In the wild, labyrinth fishes live in weedy ponds and ditches which are always deficient in oxygen content. The family belongs to the Order Labyrinthici, which is characterized by the presence of an auxiliary breathing organ in addition to the gills for the retention of air for breathing. The labyrinths are located on the top of the head, behind the eyes. These fish are bubble nest builders and the tank should be supplied with a lot of floating plants. Anabantids offer some unique options to fish keepers as beginner fish. The *Colisa fasciatus* is an important fish with respect to its value as food as well as for ornamental use and is also easy to feed on live, frozen and flake feeds [1].

Studies on the effect of dietary pigments on the coloration and behavior (Baron et al. 2008) [2], prolactin uptake by the kidney [3], respiration exposed to lindane ( $\gamma$ -BHC) [4] have been reported in *Colisa lalia*. Similarly, the research conducted on *Colisa fasciatus* were on the their oocyte development to endosulfan [5], effect of a sub-lethal concentration of nickel on the gill [6], exposure to sub-lethal concentration cadmium poisoning [7], effects of crude oil on the air-breathing organs[8], ovarian functions in arsenic-treated *C. fasciatus* [9], impact on the carbohydrate metabolism due to the toxicity of manganese [10] and chromium [11], acute toxic effect of BHC on gills, liver, stomach and intestine [12]. Report is also available on the effect of various types of feed on biomass conversion rate as well as on gonad weight in *Colisa fasciatus* [13].

However, no study has been reported on the larval development stages of the locally available *Colisa fasciatus* from North-East India. Therefore, the present study was undertaken to ascertain and observe the different larval development stages of *C. fasciatus* to standardize the breeding techniques and for their probable commercial production in captive condition in spite of being popular as ornamental fish as well as a larvicidal fish.

### MATERIALS AND METHODS

In the breeding program, healthy fully matured females with carrying eggs and matured males were selected. Sex ratio was maintained at 1: 1 (Male: Female). Very gentle aeration flow was maintained in the tank to facilitate nest building by the male on the surface. The female and male were introduced into the tank and left for a few days to get used to new surroundings. After satisfied with new breeding tank environment the male start keep-blowing bubbles with saliva till they form a nest shape of white sticky froth which floats on the water surface. When the nest formation was completed the pair will became ready to mate. At spawning time the male wrapped his body round the female in such a way that her belly turned upwards so that when she released her eggs they float up into the slightly sticky bubble nest. Once this was achieved, he will then curved his body into a U-shape underneath and between the female's body and squeezed the eggs from within her, fertilizing them at the same time. The floating eggs were released in a series of spawning embraces underneath the nest. The scattered eggs were collected by male in his mouth and fixed all the eggs in the bubble nest. The male guarded the eggs, which also cares the hatchling for 2 days. After spawning the female was removed from the tank immediately leave the male to guard and maintain the nest along with the newly hatched hatchlings. In about 24 h the nest broke apart and eggs hatched within 24 h issuing hundreds of black comma shaped fry and they become free swimming another 3 day.

Eggs that have missed fertilization appeared with a coating of fungus non-productive and hence removed from the tank to avoid any contamination to the young ones. During the breeding trial, optimum water quality was maintained. Partial water exchange was done for better breeding response among the brooders. It was also observed in the present findings that a bath treatment of salt solution for 1 min induced breeding. The bubble nest was built without the help of vegetation and when banana leaves were provided the bubbles would be formed beneath or between floating leaves; the male makes a number of bubbles on the surface then carries them under nest. Water droplet spitting in brood care and making sand hills into the nest, are characteristics observed in the present experiment was unique. The male guards the eggs until hatching. Hatching time is observed between 30-36 h at 26-28 °C. The free swimming hatchlings of 7 days old were fed with sieved small zooplankton and infusorians for 12-14 days and then young ones are fed with zooplanktons and other granular feed.

### RESULTS AND DISCUSSION

The larval developmental stages in the present study, from day one old larvae to 30 day old fry of *Colisa fasciatus* has been demonstrated in Figure 1 to 11 along the identical larval developmental stages characters mentioned in Table 1.

Table 1: Progression of larval characteristic of *Colisa fasciatus*

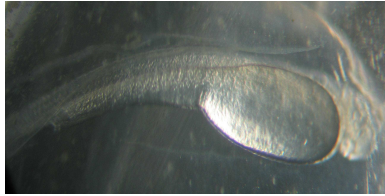
Age (After Fertilization)	Character
1hr	Eggs Become Straw Color
20hr	Embryo heads project beyond the yolk-sac anteriorly and tail projects posteriorly.
24-30hr	Hatchling looks dull white laden with yellowish yolk-sac.
40hr	Yolk sac reduced in size and mouth & operculum formed.
50hr	Dorsal fin formed and Yolk sac completely absorbed.
6days	Caudal fin rays & Pectoral fin buds appear, pigmentation founds over the body.
10days	Fry stage appear
18-20days	Peacock-blue and red colour appears on the dorso-lateral side of the body.

It has been reported that *Colisa fasciatus* is more active in the night than during the day [14]. It has been reported by several authors and recently by researchers that male of *C. fasciatus* is generally larger than females of the same age and much brighter in colour [15], which has been also observed in the present study and the breeding pairs were selected based on these observations. They also found that eggs of *C. fasciatus* hatched after about 24 hours incubation in the bubble nest at a temperature of 28 °C. It was also found that hatchlings were around 1.7-2.0 mm in length, and might reach 1.0 cm after one month, which is in agreement with the present study.

Anabantids contributes a major portion in the aquarium trade from the wild stocks. Anabantids have a good market potential in the international market due to their beautiful coloration. They have a good market demand in the domestic market as 'live edible fish'. To conserve the biodiversity of the Anabantids, mass scale production techniques should be disseminated to aquarium fish breeders. The production techniques developed by this study

will help the aquarium fish breeders to start backyard units. Organization of aquarium exhibition and awareness program will stimulate the aquarium fish keeping as a hobby among the people of the region as a whole and keeping the local indigenous ornamental fishes like anabantids in particular.

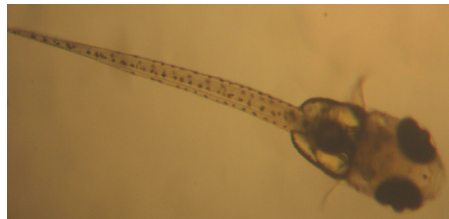
**Larval Developmental Stages of *Colisa fasciatus*:**



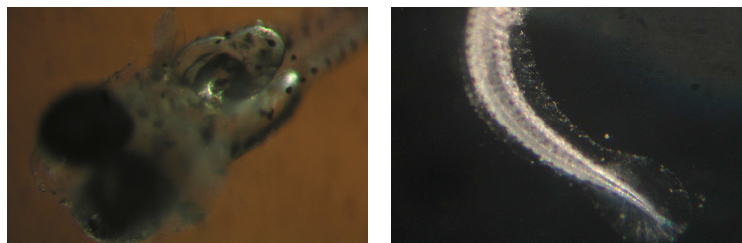
**Figure 1: One day old larval stage under microscope**



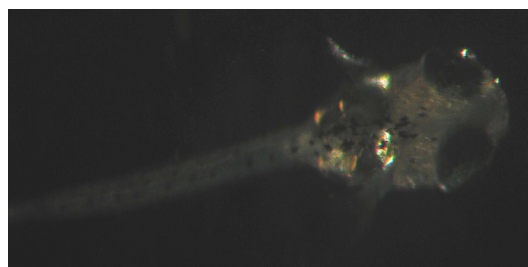
**Figure 2: 4 day old hatchling with tail fin development**



**Figure 3: 6 day old hatchling with developed mouth gap and eye**



**Figure 4: 8 day old hatchling with hair like structure in tail region**



**Figure 5: 10 day old hatchling with double pectoral fin**

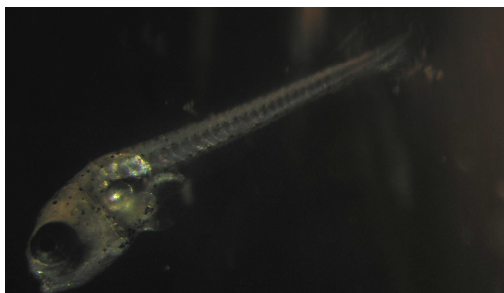


Figure 6: 12 day old hatchling with superior and protrussible mouth



Figure 7: 14 day old hatchling with fully developed eyes

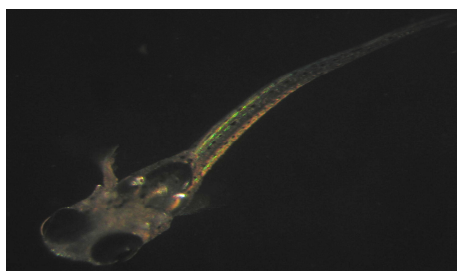


Figure 8: 16 day old hatchling with color pigmentation on body

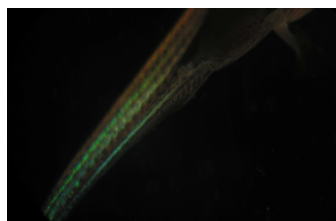
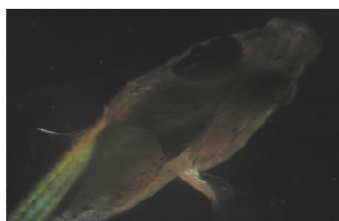


Figure 9: 18 day old hatchling with broaden head and tail

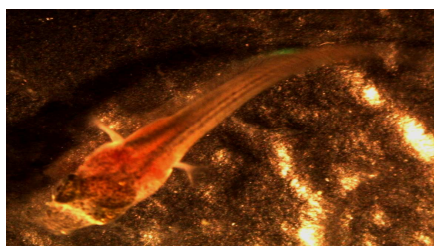


Figure 10: 21 day old hatchling with elongated body and rounded caudal fin



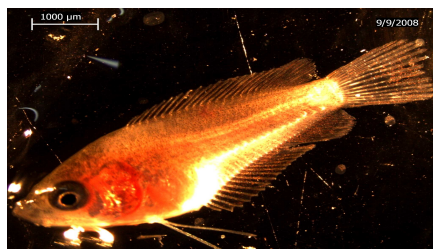


Figure 11: 30 day old fully developed banded gourami, *Colisa fasciatus*

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