

Captive breeding of thick-lipped Gourami, *Trichogaster labiosua* (Day) by gradual increasing aquarium water temperature and their early life stages

Yurembam Motilan, Konsam Nishikanta

Department of Life Sciences Manipur University, Canchipur, Imphal, Manipur, India, 795 003

Abstract- For the breeding of *Trichogaster labiosua* (Day), male and female individuals were kept in the ratio of 1:1 in clean and clear water containing the aquatic weeds, *Hydrilla sp.* *Trichogaster labiosua* easily bred in the aquarium conditions on gradually increasing temperature of aquarium water. Nesting behaviour of the fish was observed within the temperature range 24–28°C. Spawning rate ranged from 20,000–25,000. The developmental period was observed between 18–25 days.

Index Terms- *Trichogaster labiosua*, beautiful colouration, increasing temperature, easy to breed, aquarium fish.

I. INTRODUCTION

Thick-lipped Gourami, *Trichogaster labiosua* (Day) locally known as Pheteen in Manipuri is characterized by its greenish colouration, lighter ventrally. Body has 8–10 oblique vertical dark bars on the sides, blue horizontal stripes on the body. Fins are dark, with outer edge of anal fin yellowish red. The fish is widely distributed in rivers, ponds, swamps, lakes of India and Myanmar (Vishwanath, 2007). The fish generally breeds inside the bubble nest which is prepared by the bubbles secreted from the male fish, in the shallow water bodies such as paddy fields, ponds, swamps, ditches etc. during the pre-monsoon season. The fish is gaining its importance because of its food value and ornamental purposes. Presently, most of the aquacultural production of ornamental fishes is focused on freshwater species and when a species is discovered by the aquarium trade, the sudden interest, if any, often leads to the decline in wild populations of that particular species (Tlusty, 2002). This depletion is attributed to the commercial collection of the fishes for the purpose of ornamental fish trade. Perusal of related literature shows that prior record or study related to the embryonic development of this species in particular has not been published so far. Hence, this experiment was designed and performed to study the newly hatched eggs and embryonic development under the laboratory conditions. The newly hatched *T. labiosua* and its subsequent developmental stages are described here.

II. MATERIELS AND METHODS

1. Collection of brooders

Fishes were collected by netting from the pond inside the campus of Manipur University, Canchipur, Imphal. Live fishes were transported to the laboratory in polythene bags, partially

filled with oxygen by following the method of Esther & Verhallen, 2005.

2. Identification of fish

For the accurate taxonomic identification of the fish, measurements and counts were done following Vishwanath *et al.*, 2007. Measurements were taken point-to-point with a digital caliper on the left sides of the specimens to the nearest 0.01mm. Lica S8APO stereo zoom microscope under transmitted and reflected light was used to count the fin rays, scales and lateral line pores.

3. Culture of fish

Fish were cultured in Manipur University Aquarium of Fishes in the aquarium size of 90 × 45 × 30 cm³. Daily feed of the fish was provided; the optimum temperature for proper growth and development was checked and looked after well to ensure that all the fish remained healthy without any aberrant behavior. Lost leaves and excess plant debris were removed carefully; the dirt and excreta were also siphoned out from the bottom part of the aquarium water, at least, once in a week.

4. Identification of sex

Sexual dimorphism was assessed on the basis of genitalia, oozing milt, swollen vent and body colouration.

5. Breeding technique

The experiment was conducted on 2+ year old, 15–22g body weight *Trichogaster labiosua* of 20 gravid females and 20 males (n=40) in 20 aquarium with the size of 90 × 45 × 30 cm³ each. The brooders were randomly distributed into different aquaria at the male to female ratio of 1:1 (PLATE 1). After spawning, the fecundity of each female was determined by randomly taking samples of eggs in a 10 ml graded tube. For this, total number of eggs in 1ml was counted and was then multiplied by the total volume of eggs released. Fertilisation rates of eggs were determined by randomly taking a sample of approximately 100 eggs in a petri dish. Only fertilized eggs with intact nuclei were counted for the percentage of fertilization. The environmental conditions observed during the breeding period were: Room temperature (25 ± 9 °C), water temperature in the aquarium (23 ± 4°C), pH (6.8–7.2) and DO (5.5–6.3 ppm).

6. Larval rearing technique

Larvae were reared by feeding powder food sera-micron; Tubifex worm powder and some aquatic live foods collected by the use of plankton nets.

7. Study of early stages

Fertilized ova were placed in petri dishes containing fresh water. The water in the dishes was changed every 48 h. For the observation of the embryo, the embryo was kept on the cavity

side and observed by Lica microscope. The surface feature of the embryo was studied using Scanning Electron microscopy (Fig. 7 & 8 of PLATE 2). Description of post larval development was based on embryonic specimens obtained by plankton net from aquarium in June, July and August, 2014. Measurement of the total length of each of the specimens was taken after being immobilized in cooled water which made the photography of specimens possible without causing any shrinkage due to death, anesthetics and preservatives.

III. RESULTS

1. Sexual dimorphism

Males were colourful. The females had swollen vent, bulging in mature forms.

2. Effect of temperature on nesting and breeding

At temperature above 20°C, the male soon started producing bubbles from its mouth which float on the water surface forming the bubble nest (Fig. 2 of PLATE 2). Then, the male guided the female to a position below the nest which the male had prepared and then warped its body around the female's body in such a way that their vents were closed together. This "nuptial embrace" took place repeatedly till the female released the eggs which were immediately fertilized by the male at temperature, 22°C–28°C. As the eggs fell slowly to the bottom, the male left the female and caught the eggs in its mouth. Then he moved up and down the eggs into the nest and stood guarding over them.

3. Incubation of eggs

The incubation period was 20–30 hours and on hatching, the hatchling remained in the bubble nest. Within 2–3 days hatchling became free swimming.

4. *Trichogaster labiosa* at hatchling

At hatching (24°C), *T. labiosa* were 5.5–6.3mm in length, the body slender with a very long tail and the anus well forward (Fig. 2–5 of PLATE 2). Pectoral fin was well developed, although other fins remained indistinguishable from the primordial fin. Induction of eyes started, iris silver in colour; when viewed dorsally, black green and yellow. Pigmentation became prominent in the head region.

5. Post larval development

This was easily described in terms of appearance of melanophores and fin differentiation. A post larva 5.7 mm (Fig. 6 of PLATE 2) long showed a similar pigmentation pattern to the newly hatched post larva except for an increase in number of dorsal and ventral contour and mediolateral melanophores. The second dorsal and anal fins started differentiation from the promordial fin although no evidences of rays were seen. In a post larval 7.4 mm long, rays were evident in the second dorsal and anal fins and also in the caudal fin. Pigmentation got characteristically evident in this stage. A row of internal notochord melanophores could be seen. The peritoneal pigmentation expanded to surround the body cavity completely, giving silvery appearance. In 8.6 mm long embryo, the second dorsal, anal and caudal fins were discrete, the primordial fin being reduced. At this stage, the head and body cavity occupied a greater percentage of body length than earlier stage. This trend continued as the post larval stage developed further, as could be seen in the post larva 10.2mm long. By this stage, the larva had

assumed most of the adult characteristics except for the filiform rays.

IV. DISCUSSION

Bubble-nest building is the first step of the fish echogram defined by Hall (1968). In our study, 100% pairs of the fish built their bubble nest a day after the male and the female were placed together in the aquarium. Various environmental factors such as light, temperature, pH, DO, meteorological conditions etc. are known to play important role in stimulating the release of gonadotropic hormones from the anterior lobe of pituitary glands and thereby controlling the breeding behavior of the fish (Motilan *et al.*, 2013). With the gradual increase in temperature, reproductive organs of the fish are stimulated, their courtships behaviour starts. The males become stimulated first, and start the making of the bubble nest. Temperature stimulates the breeding behaviour of the fish because temperature profoundly affects, alters and determines the rate and type of biological reactions taking place inside the living systems (Hawkins, 1981). The pigmentation of the newly hatched postlarva closely resembles that of the 6.3mm post larva although the number of mediolateral, ventral and dorsal contours of melanophores differ. However, even in post larvae hatched from the same batch of eggs, the numbers of melanophores within the lines are rarely constant. The post larva 10.7mm long shows no evidence of fines rays. SEM examination reveals that pectoral fins are formed earlier than the other fins. In the complete maturation stage of 10.2mm long, filiform rays are not apparent. The study fulfills that successful spawning of *Trichogaster labiosa* also takes place in the aquarium system by gradual increase in aquarium temperature. The experiment also confirmed that *T. labiosa* has bubble nesting behaviour which is a high degree of parental care among the commercial proliferative breeders. Besides, the technique of breeding this species proved healthful for the maximum pure seed production of the species for the aquarium trade, species conservation and restoration. Breeding of this species can be easily managed in the aquarium conditions although the step of larval stage rearing is a critical step necessary for the maximal survival of the species.

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AUTHORS

First Author – Yurembam Motilan, Department of Life Sciences Manipur University, Canchipur, Imphal, Manipur, India, 795 003, Tel. +919862714161
E-mail: *motilan84@gmail.com
Second Author – Konsam Nishikanta, Department of Life Sciences Manipur University, Canchipur, Imphal, Manipur, India, 795 003



PLATE 1. Breeding of *Trichogaster labiosa* by increasing temperature of aquarium water

PLATE 2

BUBBLE NEST AND EARLY DEVELOPMENTAL STAGES OF *Trichogaster labiosa*



Fig. 1. Bubble nest



Fig. 2. Hatchling



Fig. 3. Advanced hatchling



Fig. 4. Yolk sac - stage



Fig. 5. 3 - days stage

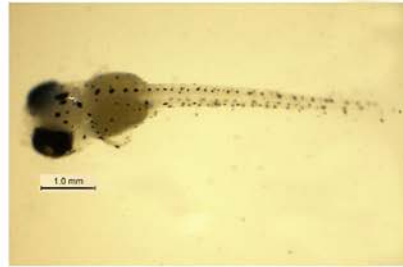


Fig. 6. 12 - days stage



Fig. 7. SEM - Image of anterior portion of 22- days stage



Fig. 8. SEM - Image of 22- days stage