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In-House Propagation and Life-History of *Nandus nandus* (Hamilton, 1822)

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Abstract

Nandus nandus is a commercially important fish. It has dual function. It is a food fish and an important ornamental fish. It inhabits lentic water bodies of north eastern states of India but may migrate into rivers during the monsoon season. A sharp decline of this species has been noticed of late, in commercial catches, so there is a need for propagation and conservation of the species throgh in-house propagation. Breeding of the species in captivity using ovaprim as inducing agent and the early larval and post larval developmental stages were studied and presented in this paper.
Key words : In-house propagation, Life-history, *Nandus nandus.*

In India, especially in the north eastern region (NER), a number of fish species exists in natural water bodies. Many of these species have ornamental value due to their beautiful color, shape, manageable size, hardness, compatibility and longivity. We have have very little know ledge on culture and breeding of indigenous fresh water ornamental fish species (OFS) of NER is due to lack of awareness and interest among the fish farmers. Among 196 OFS of NER (1) the exporter of Kolkata and Chennai through some local suppliers exports nearly 27 OFS from NER. Survey in the wholesale market at Hatibagan in Kolkata and information from exporters revealed that a large group of indigenous fish has increasing demand in overseas market like Japan and the Middle East. Although its price at the collecting site is nominal, the ultimate price at destination is quite high. Threrfore, there is a scope of developing the trade with varieties of indigenous fish species (2). These OFS are all traded on wild caught and none venture for their culture and breeding. Consequently, the population of these valuable fish species is gradually declining due to over exploiation from their natural stock. The commercial organized export of freshwater OFS of NER depends primarly on assured and adequate supply as and when demand arises which is possible only through mass in-house breeding technique. The present communication deals with the technology of captive breeding along with early development and post-larval stages which will lead to economic benefit for aquarists and entrepreneurs engaged in OFS trade.

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Methods

For experimental breeding a number of brood fish were collected from natural habitat and acclimatized in glass aquariums of 60 × 45 × 40 cm. Males and females were kept separately. The brooders were fed with live fishes supplied at regularly during 24h without any break at 6.54 and 6.95% body weight (BW) of male and femalle, respectively. During June-July 20 sets comprising male and female in the ratio of 1 : 1 were used for induced breeding. Ovaprim, a synthetic gonadotropin releasing hormone analogue (SGnRH) a product of Syndle laboratory Ltd., Vancouver, Canada was used for hypophysation. The female was administered with an initial dosage of 0.5 μg/g BW either in the morning or evening. The female was administered a second higher dose of 1.0 μg/g BW at 24 h after first injection. The male was administered a single dose of 0.5 μg/g BW along with the second dose of female. Injected brooders were releaed in glass

aquariums of 30 × 25 ×25 cm with water volume of 10–15 liter.

Results and Discussion

N. nandus showed marked differences in the size of male and female. Males were dwarf whereas females are large. The gonado-somatic index indicates that *N. nandus* had an extended breeding season which commenced from April to August, June-July being the climax of the breeding season. It is a batch breeder. Spawning occured 6 h after injection. The chief diagnostic characters of the eggs of *N. nandus* are the presence of oil globule in the yolk and pigmentation of yolk. Presence of numerous oil globules have been reported (3) in the marine species of *Cynaglossus.* But the presence of oil globule in nandiid, hitherto unreported from NER, forms a record. Usually a single oil globule is present at the center but 3—5 oil globules have also been observed in few fertilized eggs. The eggs of *N. nandus* are demersal, so it is reasonable to comprehend that the oil globule is more nutritive in function than for buoyancy (4) of the eggs. The fertilized egg of *N. nandus* is spherical, transparent and non-adhesive. The size of fertilized egg varies from 1.00—1.05 (Fig. 1).The first cleavage plane is noticeable 15 m after fertilization. At 1h 30 m after fertilization cleavage consists of cohering, sticky and cluster of blastomeres above the yolk mass, thus attaining morula stage. The expanding blastoderm covers three-fourth of the yolk sac 3 h after fertilization. The earliest indication of the embryo with antero-posterior axis is distinct at 5 h after fertilization Optic cup and notochord with 12 somites are noticed at 9 h 55 m in after fertilization. At 14 h 55 min, twitching movement of the embryo is noticed. Twitching movement is first noticed in the caudal region. The caudal region becomes free from the yolk mass and most of the yolk is covered by the embryo. Embryonic fin fold is noticeable from mid - dorsal region to anal region 16 h 35min (Fig. 4) after fertilization At 19 h 35 min, gill organization is noticed and eyes are prominently developed . At 20 h 45 min. (Fig 5.) after fertilization, the embryo moves vigorously inside the egg capsule, as a result the vitelline membrane burst and the embryo wriggles out with tail first; 28 somites are noticed along with two dark pigmented between sixth and seventh somite and somite 14 and 15 towards the caudal region.

Larval Development

Newly Hatched Pro-Larva. The newly hatched pro-larva is transparent and measures about 2.6—3.0 mm (mean 2.8 mm) in length. Yolk sac is segmented, elliptical in shape, slightly broader anteriorly and narrow posteriorly extending behind the head to the middle of the body. The primordial fin fold covers the whole of dorsal side along with the tail and the ventral side upto the posterior end of yolk sac (Fig.6). The cephalic portion is broader with prominent optic lobes. The larva remains motionless but shows uncoordinated movement for a short period. Two dark bands are noticed at somite 6 and 12 region. The present study contradicts the earlier report (5–7) that the chromatophores in newly hatched free larva are absent ; at 20 h 45 min since hatching chromatophores are distinctly recorded in *N. nandus.* Pectoral fin with rudimentary fin rays is observed (Fig. 7). At 56 h mouth formation is complete and mouth is protrusible.

Post Larval Development

Post larva, three day old (4.7 – 5.0 mm) lie mostly at the bottom of the aquarium but can swim freely. The larva feeds on exogenous food and its choice food is zooplanktons. The pelvic fin bud is observed at third day after hatching. At first day, the caudal fin starts differentiating from the primordial fin fold by caudal fin constriction. The caudal fin formation is completed on third day after hatching with 15 rays. The caudal fin is transparent with three rows of dark pigmentation. The anal fin bud is observed on third day after hatching.

Four day old (5.8 —6.2 mm) post larvae exhibit star shaped melanophores at the head region and along the dorsal fin region. The first indication of dorsal fin formation is observed on day 4.

In seventh day post larvae after hatching (8.2—11.78 mm), pectoral fin formation is completed on fifth day after hatching with the formation of 15 fin rays. Pectoral fin is transparent with pigmentation at the base of the pectoral fin. On day 7 after hatching 4 anal rays are noticed; 15 days after hatching, anal fin formation is completed with the formation of 3 spines and 8 rays. Anal fin is transparent with dark pigmenation at the base of first spine. The larva starts

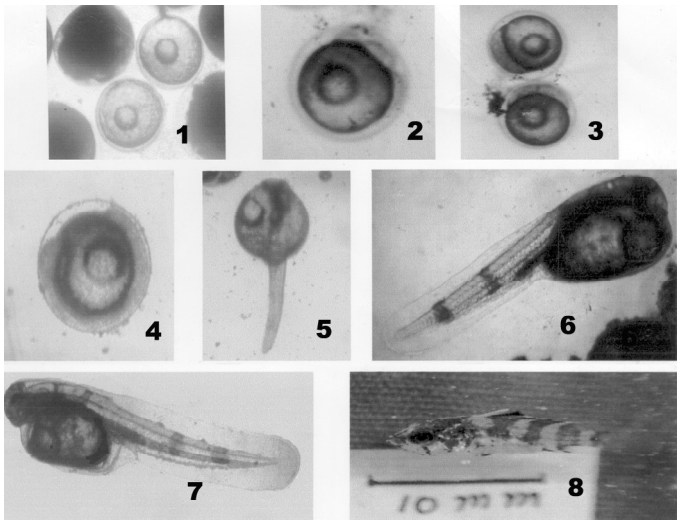

Figure 1. Larval and post-larval developmental stages of *Nandus nandus.* (1) Fertilized eggs. (2) 4-celled stage. (3) Morula stage. (4) 16 h 35 min. (5) Embryo wriggles out with tail first (20 h 45 min). (6) 2 h after hatching. (7) 1 day old larva. (8) 15-day old larva.

feeding on small crustacean larva.

In fifteen day old post-larva (13.22—15.68 mm) full compliment of fin rays have appeared in pectoral and pelvic fin. Dorsal fin has 12 dorsal spines and 11 rays. The soft portion of the dorsal fin is trasparent. Four district dark vertical bands are observed in the body with a dark blothch at the base of caudal fin. Pelvic fin has 1 spine and 5 rays. Pelvic fin is transparent with dark pigmentation on the first pelvic spine. At day 15 of hatching, a juvenile *N. nandus* is formed.

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