OBSERVATIONS ON THE LARVAE AND JUVENILES OF THE 'BHEKTI', *LATES CALCARIFER* (BLOCH) FROM THE HOOGHLY-MATLAH ESTUARINE SYSTEM

APURBA GHOSH
Central Inland Fisheries Research Institute, Barrackpore, West Bengal

ABSTRACT

The cultivation of carnivorous fishes is a new trend in fish culture practice throughout the world. Among such species *Lates calcarifer* (Bloch) is considered to be one of the most important in view of its excellent quality as a table fish. Investigations on the seed resources of these species is an essential pre-requisite for assessing the cultural possibilities. In the present communication an attempt is made to describe the characters of larvae and juveniles of *L. calcarifer* between 6 and 69 mm length which would be useful aids for identification, especially under field conditions. Information collected on the distribution of *Lates* seed in the Hooghly-Matlah estuarine system is also incorporated. The availability of the seed in significant numbers at Kulpi, Rajnagar and Shyamnagar, (24-Parganas West Bengal) during the pre-monsoon months has been highlighted.

INTRODUCTION

Lates calcarifer (Bloch) popularly known as 'bhekti' is one of the most important food fishes of India. Though essentially a marine fish, it ascends estuaries and backwaters in pursuit of food and shelter (Day, 1878). Juveniles of the species are known to frequent the lower estuarine areas and they enter the impoundment along with the tidal water which acts as the main source of seed for brackishwater fish culture in impoundments, popularly known as 'bhasabadha' fisheries in West Bengal (Hora and Nair, 1944). It is generally recognised that there is considerable scope for the propogation and cultivation of bhekti on scientific lines, particularly because enormous quantities of trash fish are left unused that could be utilised as forage.

Very little is known about the seed potential of the species in Indian waters. Naidu (1942) while surveying the fisheries of Sunderbans made a brief mention about the availability of bhekti in pools and ditches adjoining the creeks in Lower Sunderbans, West Bengal, during winter months. Pillay (1954) observed very young fry of the species entering the impoundments in West Bengal during rainy season, Gopalakrishnan (1968) has mentioned about the availability of the fry of bhekti in the Hooghly-Matlah estuarine system from May to October.

The present communication deals with the availability of bhekti seed in the Hooghly-Matlah estuarine system. An attempt is also made to describe the characters of the larvae and juveniles ranging between 6 and 69 mm length, which would serve as useful aids for identification, especially under field conditions.

Material and Methods

The collections were made at three centres viz. Kulpi, Rajnagar and Shyamnagar situated on the Hooghly, Saptamukhi and Thakuran estuaries (Fig. 1). The period of sampling at the centres chosen for the present study is determined on the basis of preliminary investigations on brackishwater fish-seed carried out during the years 1964-65 when year- round collections were made at several centres. Among the centres prospected, Kulpi was found to be the most suitable on considerations of accessibility and facilitues for quick transportation of the seed. Hence detailed studies were made at this centre for the collection of the larvae and juveniles during summer and early monsoon months (April to July). Standard Midnapore-type spawn collection nets (length 320 cm, width at mouth 310 cm, height at mouth 60 cm: and ring diameter 25 cm) with the tail piece closed at the top and fastened with the ring at the cod-end, were mostly used for the collections. The net was fixed against the tidal current by means of 4 bamboo poles, 2 at the mouth region and 2 at the ring. Apart from the shooting nets, hapa-nets (rectangular cloth piece) were also used. ½ m. tow-net made of organdi cloth was operated to collect eggs and pro-larvae of the species. The estuarine creeks, canals, innundated low lying areas adjoining the river banks, irrigation pits etc., were the common places covered for the studies. Shooting-nets were generally operated on the banks of the main estuaries close to tidal canals where sufficient current to stretch the net for two hours during high and low tides was available. Hapa-nets were generally operated in sheltered areas at the end of the high tide phase.

The collections were first preserved in 5% formalin and the bhekti larvae and juveniles ranging from 6.0 mm to 69.0 mm were taken out on the basis of following characters: Presence of large protractile mouth, spinous preopercle with angular spines, large eye, villiform teeth in jaws dorsal (with 7-8 spines, third longest) and anal fins with strong spines.

Observations

Maximum number of bhekti larvae and juveniles were available at Kulpi during May and June in hapa-net collections. The average catch was about 37/net/hour in both the months. It was 9.5/net/hour in Rajnagar and 29.3/net/hour at Shyamnagar in the month of May and June respectively. Size range of the larvae varied between 6 and 58 mm at Kulpi and between 11 and 69 mm at Shyamnagar and Rajnagar. Salinity at the centres varied between 19.3‰ and 26‰ during May and June. In July, the catch in hapa-net was 16/net/hour at Kulpi when salinity came down to 4.62‰. Tow-net collections did not yield any significant results. Salient features of the collections are given in Table below.

Other commercially important brackishwater seed encountered in the collection were: *Mugil parsia, Rhinomugil corsula, Mystus gulio, Therapon jarbua, Penaeus monodon, P. indicus, Metapenaeus brevicornis Palaemon rude, Palaemon styliferus,* polynemids and sciaenid post-larvae and most of these were caught in shooting-nets.

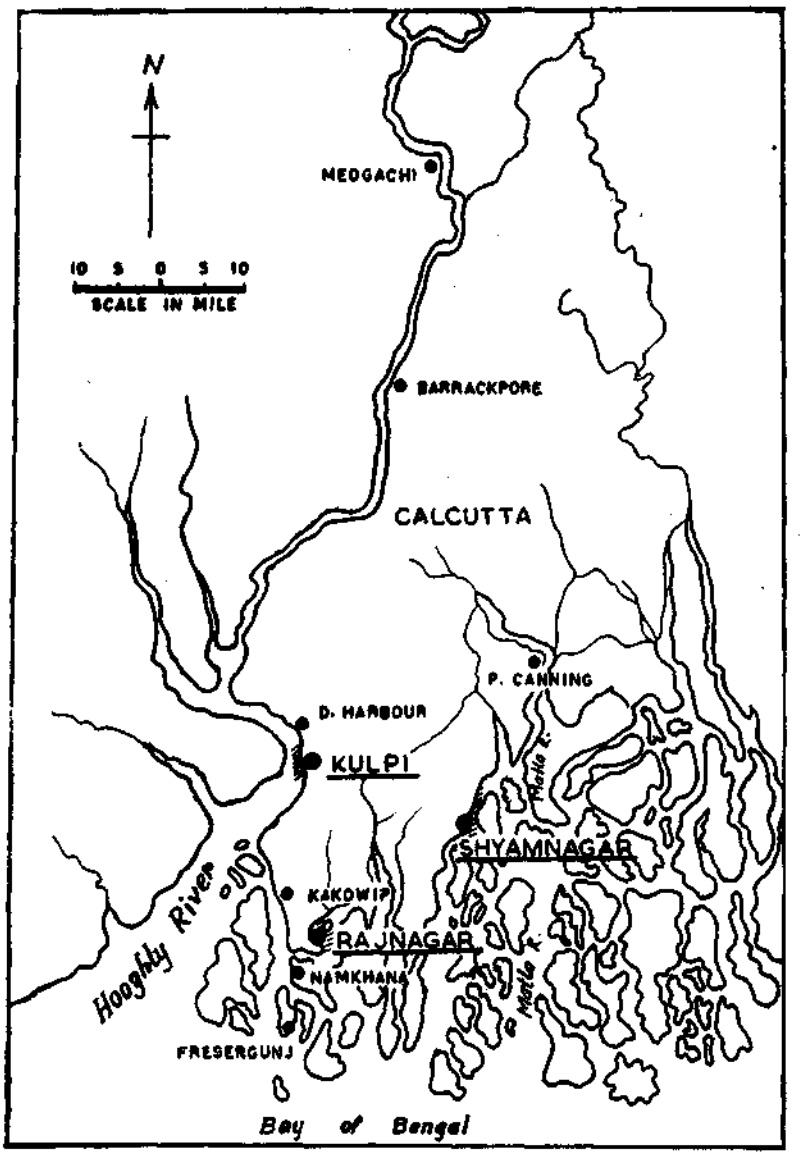

FIG. 1. Map of the Hooghly-Matla estuarine system showing collection centers of *Lates calcarifer* (Bloch).

Date of collection	Place	Name of estuary	No. of specimens collected	Size range(mm)
2—4—66	Kulpi	Hooghly	Nil	—
3—5—66	"	"	159	6—58
16—5—66	"	"	123	14—54
25—5—66	"	"	50	16—38
27—5—66	Rajnagar	Saptamukhi	19	28—59
4—6—66	Kulpi	Hooghly	112	13—38
24—6—66	Shyamnagar	Thakuran	88	11—69
16—7—66	Kulpi	Hooghly	32	27—55

Description of Stages

Larvae:

6.0 mm stage (*Fig. 2a*): In this youngest larvae present in the collections, the yolk is fully absorbed and head is prominent with concave upper profile. The mouth is oblique with gape reaching near the anterior margin of the eye. The eyes are large and pigmented and are 0.6 mm in diameter. Lower jaw is projecting. The dorsal fins, united at the base with the median fin fold attached, have been demarcated with spines and rays. The spinous portion of the dorsal extends, from 3rd to 10th myotome, and the rayed dorsal from 10th to 18th myotome. The dorsal has 5 countable spines, the 3rd being longest and with 8 rays. The caudal fin is truncate in shape and has 15 rays. The caudal connects the dorsal and anal fins by means of a small strip of median fin fold. Anal fin has 5 rays with rudiments of spines developed at the base. The ventral fin is differentiated as small membranous flap with developing rays and without any spine. Rays are discernible in pectoral fin. There are 12 post-anal and 8 countable pre-anal myotomes. The hind portion of alimentary tube is distinct and the vent lies just anterior to the 9th myotome in the posterior half of the body. A large round sac-like stomach can be recognised indicating that the larva has already resorted to external feeding. The tip of the notochord in the caudal is sharply up-turned. Chromatophores have developed in the head region along the dorsal profile in two rows and along the median region of the body. A row of chromatophores commence behind the eye and extend upto the caudal region. Chromatophores have also appeared in the body and arranged following the course of the gut.

7.5 mm stage (*Fig. 2b*): The head, the anterior region of the body and the caudal have developed further. There is a depression of dorsal profile at the nape region of the head. The continuous median fin fold connecting the dorsal, caudal and anal is no longer present. The spines and rays of the dorsal fin have been marked out more clearly by the disappearance of embryonic fin fold and consist of

8 spines and 11 clearly demarcated rays. The caudal fin has 17 fully developed rays and 6 smaller rays emerging from the sides. Anal has 3 spines 7 rays and the articulation of the spines is discernible at the base. Distinct rays are also developed in pectoral. Ventral fin has spread out, but no spine has yet been demarcated. The preopercle has 1-2 angular spines at tne ventrolateral border. Preorbital and preopercular serrations are not discernible at this stage. Chromatophores have appeared in the anterior portion of the body in four longitudinal rows from the dorsal profile to the median region of the body. Similarly, four longitudinal rows of chromatophores have developed from the base of rayed dorsal to median region of the body. Chromatophores following the course of the gut extend along tne ventral profile upto the caudal region.

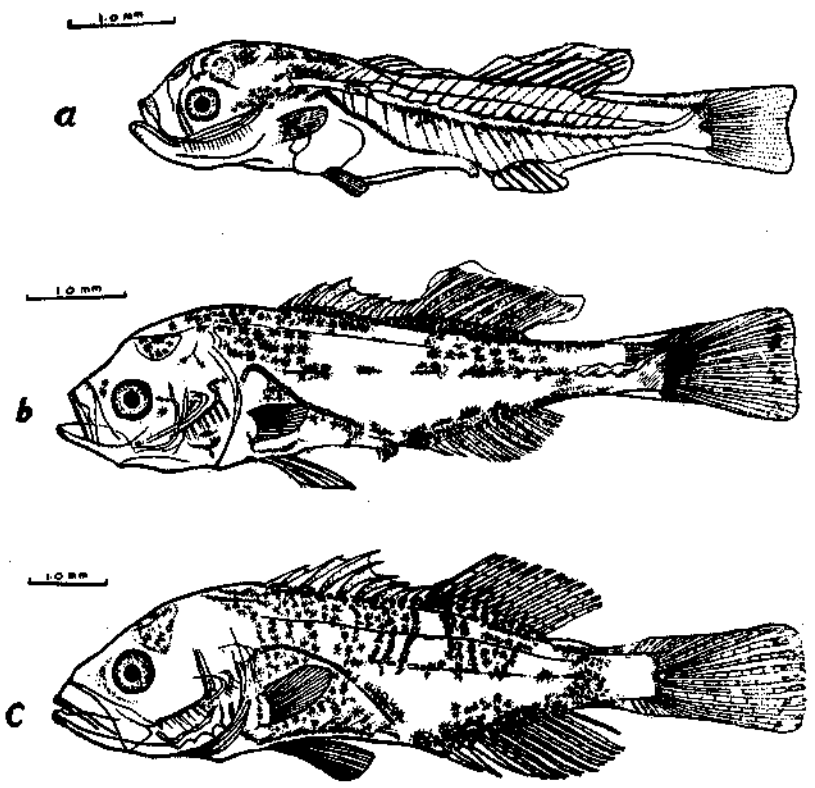

FIG. 2. Larvae of *Lates calcarifer* (Bloch). (a) (1) 6.0 mm stage (b) 7.5 mm stage (c) 10.0 mm stage.

10.0 mm stage (*Fig. 2c*): The larva at this stage acquires the general features of the adult. Elongation and depression of dorsal profile above the eye mark the formation of the characteristic snout. The dorsal and anal fins have tneir full complement of rays and spines but pectoral has 14 rays. Portion of larval fin-fold

connecting the caudal still persists in the dorsal and ventral margin of caudal. Pre-opercle has four angular spines and the margin assumes a serrated appearance. Chromatophores in the rayed dorsal and anal fin have increased further and spread out towards the corresponding median region of the body. Similarly, chromatophores at the dorsal and ventral profile of the caudal also proliferate at the median region to form chracteristic vertical bands of chromatophores.

12.5 mm stage (*Fig. 3d*): The head has acquired the characteristic features of the species. Pre-opercle has serrated margin with 5 angular spines, soft spine being clearly indicated in operculum. Maxilla reaches below the hind edge of the orbit. Villiform teeth are present in jaws, vomer and palate. The ventral has spines and caudal has grown much stronger. All the other fins have the adult complement of spines and rays. Chromatophores have assumed characteristic pattern with three vertical banos. The thick line of chromatophores present along the gut has disappeared. The scales first appear at the median region of the body, behind the pectroal fin in 12-12.5 mm larvae. The scale at this stage is cycloid and roughly triangular in shape.

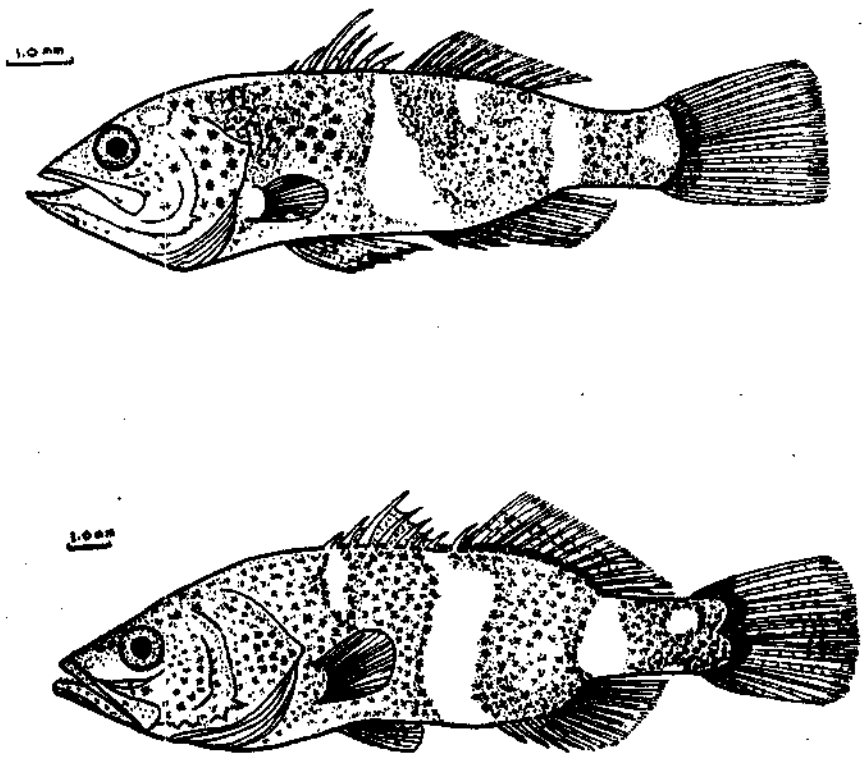

FIG. 3. Larvae of *Lates calcarifer* (Bloch). (d) 12.5 mm stage (e) 20.0 mm stage.

20.0 - 25.0 mm stage (Fig. 3e): Most of the specimens in the collections belong to this size range. Lateral line is clearly discernible and the scales behind the pectoral fin tend to show ctenoid signs. In a 25.0 *mm* specimen 2 ctenii appear apically. In general body contour and all other characteristic features, the larvae have unmistakable resemblance to the adult, except in colouration of the body. Three clear vertical bands of black chromatophores are present extending between spinous dorsal and ventral, rayed dorsal and anal and between dorsal and ventral profile of caudal. These characteristic bands of the larvae serve as a useful aid for identifying the species in the field.

38.0 mm stage: This stage is very much similar to the previous stage except in some changes in the shape of the bands of chromatophores. The vertical band of chromatophores in between the anal fin and the rayed dorsal is still present. The band situated below the spinous dorsal extends upto the median region of the body. Chromatophores in the caudal region are scattered. Ventral profile except the anal and ventral fins start turning white in colour due to the absorption of chromatophores.

Juveniles:

52.0 - 69.0 mm stage: This stage resembles the adult fish in alomst all characters except in size and silvery colouration of the abdomen. The vertical bands of chromatophores are obliterated by their proliferation along the median region of the body. The ventral profile and its margins continue to turn white by further absorption of chromatophores. The dorsal region is greenish grey as in the adult fish.

Discussion

From the observations presented above it appears that neither the eggs nor the pro-larvae of *L. calcarifer* are generally available at the centres investigated indicating that the fish spawns in the sea and post-larvae enter the estuary. Studies on the growth of young bhekti in freshwater ponds at Kakdwip (Ghosh, 1971) have indicated that the post-larvae of the species are about 1-3 weeks old. According to Chacko (1949) the fish appears to breed close to the mouth of estuaries on the Madras coast. The species appears to breed in summer months in the inshore waters of Bay of Bengal adjacent to Chilka Lake (Jones *et al* 1954), with the peak breeding in June/July (Jhingran *et al* 1969). The fish is known to breed during the monsoon (May to September) in Thailand waters (Yingthavarn, 1951). Availability of post-larvae, measuring between 6 mm and 28 mm, during the period May to July in the Hooghly-Matlah estuarine system indicates that the fish spawns over a protracted period, during summer and early monsoon. On the basis of the availability of young specimens in Thailand rivers, Smith (1945) assumed that the fish is anadromus and migrates upstream for spawning. The present observations,

however, do not lend support to this contention as eggs and prolarvae could not be recorded from the estuary. Further studies on the breeding habits of the fish are necessary to determine the actual spawning ground of the fish.

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