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**FIRST REPORT ON DEVELOPMENT OF A CAPTIVE BROODSTOCK
AND INDUCED MATURATION OF THE SEA BASS, *LATES CALCARIFER* (Bloch)
FROM INDIA**

ABSTRACT

To develop a captive broodstock of *Lates calcarifer*, nine adult fish collected from the wild were maintained in an earthen pond of 300 sq.m with regular water exchange and feeding with live *Tilapia* over a period of 17 months. Two males attained maturity without hormone treatment. Development of ovary was noted in two females and the ova attained an average diameter of 0.4 mm. One of these was induced to final maturity by implantation of cholesterol-LHRH α pellets.

BARRAMUNDI or the sea bass, *Lates calcarifer* (Bloch) is an important coastal, estuarine and freshwater fish in the Indo-Pacific region (Grey, 1986). In India it is found along both the east and west coasts, but is more common in Bengal region. In view of its immense economic importance, it is one of the best candidate species in brackishwater aquaculture. Adequate availability of seed is the basic requirement for taking up farming of any species. Availability of seed from the wild is usually seasonal and subject to the vagaries of nature. Though considerable progress has been made in other countries in the development of captive broodstock, induced maturation and seed production of *L. calcarifer* by hormone administration (Harvey, *et al.*, 1985; Nacario and Sherwood, 1986; Lim, *et al.*, 1986; Nacario, 1986; Almendras *et al.*, 1988; Garcia, 1989; and Banichong *et al.*, 1989), so far no success has been accomplished in India in the development of captive broodstocks and their induced maturation and spawning. The present report deals with the development of a captive broodstock and induced maturation of *L. calcarifer* for the first time from India.

The authors are indebted to Dr. K. Alagaraswami, Director, Central Institute of Brackishwater Aquaculture, Dr. K.V. Ramakrishna, Head, Finfish Culture Division and to Mr. K.N. Krishnamurthy, Project Leader for the encouragements and guidance rendered during the course of this work and in the preparation of this paper. Thanks are also due to Mr. M. Kathirvel, Scientist (Sr.S) for the photographs.

To develop a captive broodstock of *L. calcarifer*, 13 adult fish in the size range of 470-800 mm/3.5-10.0 kg were collected in live condition from the Ennore creek near the bar mouth during February, 1991. The fish were transported to the Institute's fish hatchery at Ennore and acclimatized overnight in plastic pools. After acclimatization and treatment with antibiotic, they were stocked in a 300m² earthen pond having provision for lake water supply by pumping and draining by gravitation. Water exchange was done about 70% thrice a week.

Accumulated excreta and sediments in the pond were flushed out by disturbing the bottom once a fortnight. A water depth of 1.5 m was maintained in the pond. Feeding was done with

dorsal fin. This made the fish calm and facilitated easy handling. A cannula (polythene tubing having 1.0 mm dia.) was inserted through the genital pore keeping the fish with ventral

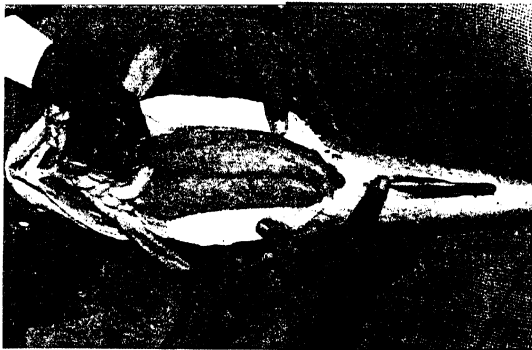


Fig. 1. Fully developed ovary of sea bass after hormone treatment.

live trash fishes at a rate of 3-5% of body weight daily. However, it took about two months for the fish to acclimatize itself to the captive condition and to start feeding. During this time four fish died. Regular feeding was noticed from April, 1991 and found that the fish fed well on *Tilapia*. Thereafter they were fed exclusively with *Tilapia*. It was observed that medium size *Tilapia* was preferred. Whenever there was a build-up of *Tilapia* population, further supply was suspended till the stock is reduced. Water quality parameters like salinity, pH and temperature were monitored daily. The stage of gonad development was also monitored at regular intervals. For this the fish were netted and held in a nylon net enclosure at one corner of the pond. Cannulation biopsy technique was followed to assess the gonad development. Each fish was examined after inserting a perforated plastic/rexine hood through the head upto the

side up. The cannula is inserted for a distance of 6-7 cm and slowly withdrawn. The other end of the cannula is held in the mouth of the operator and aspirated while withdrawing. The cannulated gonadal tissue is blown out into a watch glass containing 1% formalin. In mature males milt oozes out on application of slight pressure on the abdomen. In females the stage of maturity was ascertained by taking the diameter of 25-30 oocytes under a microscope provided with an ocular micrometer. Females having spherical nonadhesive eggs with clear perivitelline space and average diameter of 0.4 mm or above are considered ready for induced maturation (Nacario, 1986).

Induced maturation was achieved through implantation of cholestrol-LHRHa pellets. Hormone pellets were prepared by using an indigenously designed hand pelletizer. The pellet

matrix containing the hormone was prepared as per the methodology suggested by Lee *et al.*, (1985) with some modifications. The base of the matrix, 60 mg cholesterol (crystalline extra pure) was mixed with the binder (gum

30 ppt during 12 months i.e., during April-September, '91 and January-June, '92. The low saline condition prevailed (13.3-25.8 ppt) during the intervening 3 months i.e., during October-December, '91 was due to local rains,

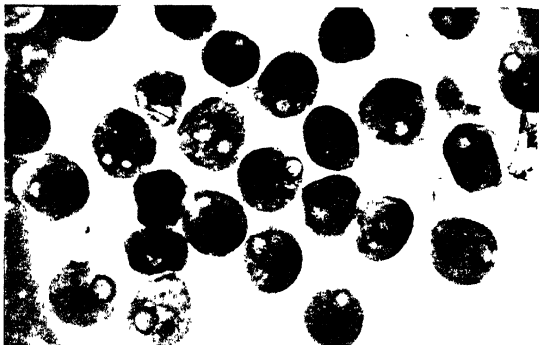


FIG 2 Unfertilized eggs of sea bass showing prominent oil globule

acacia) in a clean cavity glass. 0.2 ml of 50% ethanol was taken in a syringe and injected into the glass vial containing 1000 µg of LHRHa powder. After through shaking, the ethanol diluted hormone is drawn out and added with the base-binder mixture and mixed well using a spatula. The cavity glass is then covered with tin foil and kept for drying in an incubator at 37°C for 30 minutes. The mixture was then loaded to the pelletizer and pellet is made. The pellets were approximately 5 mm long. It is then dried for 2 hrs in an incubator at 37°C.

During the course of 17 months of this experiment, monthly average salinity ranged between 13.3-35.4 ppt during November, '91 and May, '91 respectively. Salinity was above

Water temperature ranged between 27.6°C - 32.6°C during January, '92 and April '92 and pH ranged between 7.8 -8.4 during September, '91 and April '92 respectively.

Out of the 9 fish maintained, two males (615 and 630 mm/3.25 and 3.50 kg) attained maturity with exudation of milt on application of slight pressure on abdomen during the first week of May, '92 without any hormone treatment. Cannulation biopsy in females has revealed that one female (780 mm/8.0 kg) was in advanced stage of maturity with the larger group of ova having an average diameter of 0.4 mm. The eggs were nonadhesive and spherical with clear perivitelline space. To induce final maturity, Cholesterol-LHRHa pellet implantation was done in this female in two

split doses of each 125 µg/kg body weight at an interval of 15 days. Implantation was done by making a transverse incision of 0.5 cm long and 1.0 cm deep below the dorsal fin after removing one scale. To prevent infection, the fish was subjected to antibiotic treatment after the implantation. The incision was sealed with pure vaseline. The fish was tagged after the first implantation for later identification. On the twenty fifth day, ovarian biopsy was done and found that gonad maturity has further advanced and the average size of ova has attained 0.54 mm. A resolver dose of LHRHa @ 125 µg/kg in combination with HCG @ 500 IU/kg was administered by intramuscular injection and the fish was released into spawning tank along with the two oozing males. Spawning was not observed even after two days. On examination, the female was found to have a fully developed ovary (Fig. 1) weighing 0.95 kg. The ova had an average diameter of 0.73 mm with a single oil globule having 0.22-0.25 mm diameter. The ova also had a well defined transparent perivitelline space Fig. 2. In the first week of June, '92 another female (755 mm/7.2 kg) was found to have ova of average size 0.42 mm. Induction of final maturity and induced breeding by hormone administration was not attempted in this female as the two males that have attained maturity were in resorbing stage.

Rearing fish in confined environment demands not only highly skilled and knowledgeable management but also required provision of adequate amounts of oxygen, removal of wastes and quality diet (Ali, 1986). Management measures followed like regular water exchange, flushing out of excreta, water level maintenance and proper feeding in the

present experiment have helped the successful development of a captive broodstock. LHRH has been used to advance the spawning in a number of fishes (Lam *et al.*, 1976; Anon, 1977; Aida *et al.*, 1981). The use of pelleted hormones to induce gonadal development and to synchronise ovulation and spawning is gaining considerable popularity (Crim, 1985). The effectiveness of cholesterol-based hormone implants to induce gonad development and spawning in fish is largely due to the sustained release of the embedded hormone (Garcia, 1989). Individual sea bass spawns consecutively on several nights if exposed to a sustained release of Gn RH analogue. The same individuals can be induced to spawn again in this pattern later in the season. Pellet implantation is more reliable, cheaper and less stressful to the fish (Almendras *et al.*, 1988). They have also suggested that for induction of spawning of sea bass ranging in body weight from 1 to 5 kg the threshold dose of LHRHa in a cholesterol pellet formulation is approximately 25-125 µg hormone/pellet. Sherwood *et al.*, (1988) found that 95 or 100% cholesterol pellets may be most suitable for sustained release in fish requiring days for final maturation of the ovary or in fish spawning on several successive days. In the present study a dose of 250 µg LHRHa/kg body weight of fish in two split doses at 15 days interval administered in 95% cholesterol pellet by implantation, followed by a resolving dose of LHRHa @ 125 µg/kg body weight in combination with HCG @ 500 IU/kg body weight was found to be successful in advancing the maturity stage and to attain final maturity judged by the increase in the average ova diameter from 0.4 to 0.73 mm through 0.54 mm.

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RARE SQUID, *THYSANOTEUTHIS RHOMBUS* TROSCHEL FROM THE GULF OF MANNAR, INDIA

ABSTRACT

The occurrence of a rare oceanic squid, *Thysanoteuthis rhombus*, off Voerapadiapattam in Gulf of Mannar on the east coast of India is reported.

EPIPELAGIC oceanic rhomboid squid *Thysanoteuthis rhombus*, has a thick cylindrical muscular mantle, wide anteriorly and gradually tapering to a blunt end posteriorly. The fins are long and occupy continuously the entire length of the mantle along the sides. The shape of the fin is characteristically rhombic being very broad at the middle and tapering towards the anterior and posterior ends. The head is

shorter than its width. Eyes are prominent. The oral arms are long with cirrate trabeculate protective membranes. The outer lateral arms are the longest and the inner dorsal arms are the shortest and provided with a crest like muscular projection at the base of each arm. The other arms are intermediary in length and devoid of such structures. All the arms are with two rows of suckers and the sucker rings

are with 20-26 sharp teeth. The funnel and mantle locking apparatus is typical and the

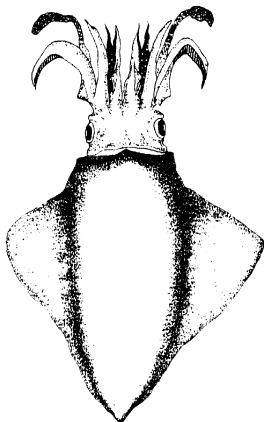


FIG. 1. Dorsal view of *T. rhombus*

cartilage is characteristically '1'-shaped as shown in Fig. 2. The tentacles are rather weak and the clubs are slightly expanded in the middle, with four rows of suckers; sucker rings with 15 - 20 sharp teeth.

This specimen was caught at a depth of about 60 m by *parovalai* a type of drift gillnet with mesh size 120 - 170 mm on the very early morning of 30th June, 1994. This squid measured 700 mm in mantle length on the dorsal side and it is reported to grow as large as 100 cm (Roper et al., 1984). Various morphometric measurements obtained are given in Table 1. The wet weight of the squid was recorded to be 12.25 kg and it was a female.

Figures 1 and 2 exhibit the dorsal and ventral views of the squid along with the funnel locking apparatus, tentacle club, sucker ring and the upper and lower beaks.

This monotypic species is well defined by Roper et al., (1984). The occurrence of this species is known in the North and South Atlantic, in particular, from strandings near the Cape of Good Hope (Barnard, 1947) and Algoa Bay (Bruggen, 1962), in the Pacific - off Japan,

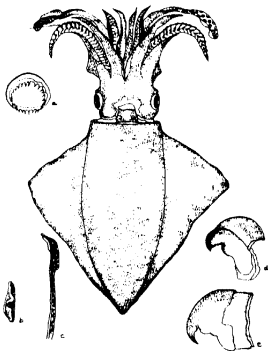


FIG. 2. Ventral view, funnel locking apparatus, tentacle club, sucker ring, upper and lower beaks

China and Benin Islands (Sasaki, 1929; Pfeffer, 1912; Nishimura, 1966). Voss and Erdman (1959) have dealt in detail the distribution of this species in the Atlantic and Pacific Oceans and they have remarked that despite the paucity of records of adult specimens, this is almost certainly a common pelagic species. As seen from the cephalopod collections made by Dana expeditions in the North Atlantic that a number of thysanoteuthid larvae were caught and the lack of capture of adults was probably due to their size and speed.