

EGGS AND EARLY LARVAE OF THE SAND WHITING, *SILLAGO SIHAMA* (FORSSKAL)

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ABSTRACT

Planktonic eggs of *S. sihama* have been identified from Mandapam in the south-east coast, based on similarities in the ripe ovarian eggs as well as other characters. The ripe ova range in diameter from 0.53 to 0.78 mm, have a single oil globule in the diameter range of 0.150 to 0.167 mm and show faint vacuolation of yolk. The planktonic eggs have diameter range of 0.55 to 0.89 mm, in various stages of development, the size gradually increasing with progressive development. The oil globules show the same diameter range as that of the ripe ova and the yolk has faint vacuolation. In early embryos melanophores appear on the oil globule and dorsal side of the head. With more development, the above pigmentation increases on the body also, accompanied by the appearance of diffused xanthophores. Hatching takes place in the afternoon of the day of collection, the newly hatched larva measuring 1.54 mm and its pigmentation is in the form of melanophores and diffused xanthophores. The 24-hours old larva measures 2.42 mm, with melanophores mostly along the dorsal and ventral margins of the body and xanthophores in the form of five vertical bands. By 48-hours (measuring 2.56 mm), the post larval phase has set in, with pigmentation of the eyes, formation of the mouth, etc. The similarities of the present material with those of the eggs and early larvae of *S. japonica* as well as the difference from it, are discussed.

INTRODUCTION

The "Sand whittings" of the family Sillaginidae are of commercial value in India, in both the capture and culture sectors. Dutt and Sujata (1980) have recognised seven nominal species from Indian Region, including four new records. McKay (1980) and Fischer and Bianchi (1984) have listed five species, of which only two, *Sillago sihama* and *S. vincenti* are commercially important in India, the latter solely from estuaries of Kerala. Tomiyama and Abe (1958) have pointed out that the so-called *S. sihama* reported to occur in Japan is nothing but *S. parvisquamis* Gill. But, recently McKay (1985) has elucidated that the above are misidentifications and that both *S. sihama* and *S. parvisquamis* from Japan are only *S. japonica* Temminck and Schlegel.

In India, Radhakrishnan (1957) studied the biology of *S. sihama* from Mandapam area in the south-east coast, including its maturation and spawning. Similar studies from Karwar in the west coast were made by Palekar and Bal (1961). More recently, James *et al.* (1976) dealt with the possibility of its culture, including spawning at Mangalore, in the west coast. Some early developmental stages of this fish from Vellar estuary in the south-east coast have been described by Bensam (1984, 1989). The account on the eggs and larvae by Ueno, Senta and Fujita (1958) from Japan can only be that of *S. japonica* and not of *S. sihama*, as recently elucidated by McKay (1985). Hence, the present communication on the eggs and larvae of *S. sihama*, collected and studied at Mandapam may be of interest.

MATERIAL AND METHODS

In the course of studying the live ichthyoplankton samples collected from Palk Bay and Gulf of Mannar at Mandapam (Long. 79° 48'E and Lat. 9° 14'N) during November, 1985 to February, 1986, among other kinds of eggs a number of the presently described eggs, were observed. The plankton net used was 1.5 m long and 0.5 m in mouth diameter and was made of No. 20 bolting silk. It was towed in the surface waters for about 15 minutes between 05.00 and 06.00 hours.

In order to ascertain as to which fish these particular eggs belonged, an examination of the maturity conditions and spawning of various fishes landed at Mandapam was undertaken simultaneously. As a result of this exercise, it was observed that *Sillago sihata* was in advanced maturity stages and spawning condition there. The intra-ovarian ova from ripe females were studied under the microscope; and their characters have tallied with the planktonic eggs in their early stages of development. This and other features of the eggs in various stages of development as well as of the larvae hatching out of them have contributed to their identification.

The methods of rearing of the eggs and early larvae from them in the laboratory, their scrutiny and drawing are the same as has been reported earlier (Bensam, 1984, 1986). Also, the guidelines followed for identification and terminologies used are those as reviewed by Ahlstrom and Moser (1976, 1980, 1981), Russell (1976) and as followed by Ahlstrom and Counts (1955) and Bensam (in press).

OBSERVATIONS

Ripe ova

The ripe ovarian ova of *S. sihata* collected during January-February, 1986 (Fig. 1) are spherical, colourless and transparent.

with diameter ranging from 0.53 to 0.78 mm. A single, shining oilglobule ranging from 0.15 to 0.167 mm in diameter is present in each egg. Faint vacuolation is visible in the yolk; and a peri vitelline space is absent.

Planktonic eggs

The planktonic eggs collected on 31-1-1986, 7-2-1986 and 14-2-1986 were observed to be in varying stages of development, including some without indication of an embryo and resembling the ripe ova (Fig. 1). A few of the latter were isolated and measured, showing that these ranged in diameter from 0.55 to 0.75 mm with an oilglobule in the range of 0.150-0.165 mm. After about one hour, the eggs which were reared have shown the formation of blastoderm and development of a narrow perivitelline space. The egg diameters were observed to register a gradual increase in the course of development, thus those in the blastoderm stage measuring from 0.55 to 0.70 mm and those with developing and fully developed embryos measuring 0.77-0.89 mm. The single oilglobule in each egg ranged in diameters from 0.151 to 0.168 mm. The eggs in "middle" and "late" stages of embryonic development (Ahlstrom and Counts, 1955; Bensam, in press) showed a progressive pattern of pigmentation, from unpigmented condition in the blastoderm stage. In the early embryonic condition (Fig. 2), melanophores have developed on the oilglobule and on the dorsal side of the anterior part of the body. The above pigmentation has increased in a later stage (Fig. 3) and is fully developed in the late egg (Fig. 4). In the last two stages, diffused patches of xanthophores have also developed on the head and dorsal side of the body.

Early larvae

A batch of eggs reared in the laboratory on 31-1-1986 hatched out in the same after-

noon at about 1230 hrs. The newly hatched larva (Fig. 5) measured 1.54 mm in length and has a prominent yolk sac. Pigmentation on the body and oilglobule is in the form of melanophores and diffused xanthophores. The number of myomeres is 15 preanal and about 20 postanal. The 24-hours old larva examined on 1-2-1986 (Fig. 6) increased in length to 2.42 mm. The body and the alimentary canal have become elongated and the oilglobule has become smaller. Pigmentation has become localised, the melanophores mostly along the dorsal and ventral margins of the body and the xanthophores mostly in the form of five vertical bands, of which three are preanal and two postanal in position, these bands disappearing in about 15 minutes after fixation. The number and disposition of the myomeres have continued to be the same as in the previous stage.

In the 48-hours old stage, measuring 2.56 mm (Fig. 7), the essential postlarval features have appeared, such as formation of the mouth, indication of the pectoral fin and pigmentation of the eyes. The body depth has become slightly more than before. A patch of melanophores has appeared on the head dorsally; also, a row of pigments has developed along the ventral side of the foregut. The number and disposition of the myomeres have become 13 preanal and 21 postanal, the total tallying with the adult vertebral number.

REMARKS

The identification of the present eggs and early larvae as those of *S. sihama* is based on the evidence of the coincident occurrences of the spawners and free eggs, the similarity of the ripe ova with the eggs in the early stages of development as well as a few other characters of the eggs and early larvae. The faint vacuolation of the yolk, narrow perivitelline space and appearance of melanophores and

xanthophores on the embryo and oilglobule are all features characteristic of the eggs and early larvae of sillaginids (Ueno *et al.*, 1958; Mito, 1963). The number of myomeres after stabilisation in the early postlarval condition is the same as the adult vertebral number. The forward shifting in the position of the vent in the early larvae noted in *S. sihama* has also been the case in those of *S. japonica* described by the above authors.

Among various species of *Sillago*, there are only two papers available on the eggs and larvae so far, both from Japan by Ueno *et al.* (1958) and Mito (1963). Recent studies by McKay (1985) have shown that the material dealt with in the above two publications can belong only to *S. japonica*. From this it may be stated that the planktonic eggs of *S. japonica* have a diameter range of 0.63-0.82 mm, with oilglobule in the range of 0.151-0.194 mm. This is quite possible for *S. japonica* because the ripe ova of *S. sihama* from India also have a wide range of diameters from 0.42 mm (Radhakrishnan, 1957) to 0.78 mm as observed in the present study. In *S. japonica*, the early larvae seem to possess 35-37 myomeres, whereas in *S. sihama* there are only 34-35 myomeres, the number getting stabilized to the adult vertebral condition of 34 in the early postlarval stage.

Bensam (1984, 1989) has described a few postlarvae of this species from plankton of the south-east coast. Of these, the earliest stage is of 2.8 mm length. In the present work of laboratory rearing, the 48 hours old stage measures 2.56 mm. From these it appears that the 2.8 mm stage already described may be slightly older than 48 hours. The presence of pigmentation on the forehead is a similarity between the two, in addition to other common features. But, in the disposition of myomeres there is a difference between the two stages, 7

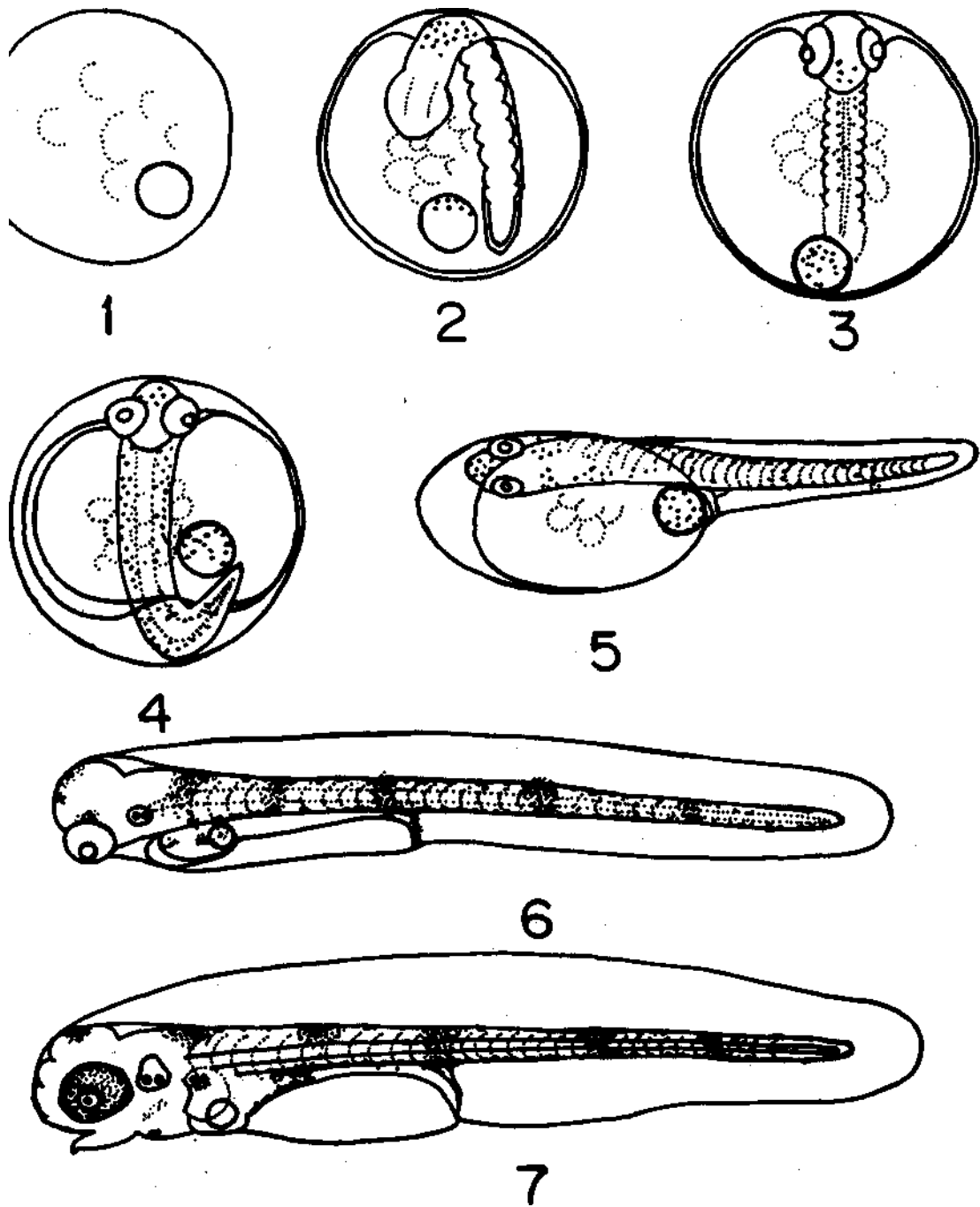


Fig.1. Eggs and early larvae of *Stilago sihama*. 1. Ripe ovum, 2 and 3. Two stages of "middle" egg, 4. A "late" egg, 5. Newly hatched larva, 6- 24-hours old larva, 7. 48 - hours old larva.

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preanal and 27 postanal in the 2.8 mm postlarva described by Bensam (1984,1989) and 13 pre-anal and 21 postanal in the 2.56 mm one reared in the present work. This difference may be attributed to the forward movement of the vent in the course of development, reported in sillaginids.

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