EGGS AND EARLY LARVAE OF THE GREY MULLET *VALAMUGIL SEHELI* (FORSSKAL)

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ABSTRACT

Planktonic eggs collected from Palk Bay and Gulf of Mannar and identified circumstantially as of *Valamugil seheli* (Forsskal) were reared in the laboratory up to the 72-h postlarvae. The eggs ranged in diameter from 0.621 mm to 1.09 mm and were with single, pigmented oilglobules ranging in diameter from 0.212 mm to 0.273 mm. The perivitelline space was narrow. The yolk, being neither segmented nor vacuolated, was clear. Newly hatched larvae measured 2.179mm. They had black pigment spots on the dorsal side of the body, with a few localised, yellowish networks of xanthophores. In the 24-h larva, most of the black pigment spots had migrated to the ventral side of the body. The 48-h-old larva had its mouth formed, eyes pigmented, yolk utilized and pectoral fins developed, and so was in the early postlarval stage. In the 72-h larva there was increase in pigmentation along both dorsal and ventral aspects of body. In this postlarval phase the number of myomeres had stabilized at 25, corresponding to the adult-vertebral number.

The eggs could be distinguished from those of the allied species by their size and/or the size of oilglobules. By the location of the oilglobule as well as by the nature of pigmentation the early larvae could be distinguished from those of *M. cephalus*.

INTRODUCTION

Our knowledge on the eggs and early larvae of Indian grey mullets is chiefly due to the work of Pakrasi and Alikunhi (1953) on the freshwater species *Mugil corsula* and of Nair (1957) and Chaudhuri et al (1978) on *M. cephalus* and of Natarajan and Patnaik (1973) and Sebastian and Nair (1975) on *Liza macrolepis*, both marine as well as estuarine. Recently, the eggs and early larvae of two more marine-cum-estuarine species, *Liza tade* and *L. dussumieri*, were described by Bensam (1983). In the present paper, the eggs and larvae of another species, *Valamugil seheli*, a commercially important mullet both in capture fisheries and in culture practices (James et al 1984) and distributed in the eastern Indian and western central Pacific areas (Fischer and Whitehead 1974), are reported. The fish grows to about 45 cm and inhabits

shallow coastal waters, lagoons, estuaries, etc. Judged by the appearance of partly and fully spent specimens in local catches, *V. seheli* spawns around Mandapam during July-September.

Material and Methods

Planktonic eggs were collected on and subsequently to 6-7-1985 from Gulf of Mannar and Palk Bay, from a distance of about 5 km where the depth was about 3 m. Characteristic features of egg such as diameter, nature of yolk, diameter of oilglobule, pigmentation, etc were studied while the eggs were in living condition. The eggs were reared in the laboratory and the early larval stages such as the newly hatched, 24-h, 48-h and 72-h stages were studied, immediately after having fixed in formalin. The figures of the eggs and larvae were drawn with the aid of a camera lucida. Accordingly to the definitions given by Russel (1976) the term "larva" has been used for the stages up to formation of mouth and "postlarva" for the stages after formation of mouth.

Observations

Egg

Of the eighteen live planktonic eggs measured in various stages of development, the diameter ranged from 0.621 mm to 1.09 mm. They had single oilglobules in diameter range 0.212 mm-0.273 mm. Perivitelline space was very narrow. Yolk was clear, neither segmented nor vacuolated. Minute, punctate, black pigment spots were present in the oilglobule.

Two embryonic stages were also available in the present collection. In one, in the earlier stage of development (Fig. 1, A), the tail was being developed and the head had a few black pigment spots. In the other, of a more advanced stage, ready for hatching (Fig. 1, B), black pigmentation had increased on the head, in the postcephalic region and along the dorsal side of the body. Also, networks of xanthophores were present behind the eye, in the auditory region, in the midgut, above the vent and in the postanal region.

Larvae and Early Postlarvae

The eggs that were reared in the laboratory on 6-7-1985 hatched in the afternoon. The newly hatched larva (Fig. 1, C) measured 2.179mm. Yolksac was prominent and the body was gradually tapered behind. The oilglobule was at the ventral aspect of the yolksac and contained black pigments and xanthophores. Along the dorsal aspects of the anterior, middle and posterior parts of the body black pigment spots were present. Besides, localised networks of xanthophores were present behind the eye region, in the postcephalic aspect, in the midgut, above the vent and at three locations in the postanal region. The network above the vent was more prominent than the ones behind it. About 21 myomeres were

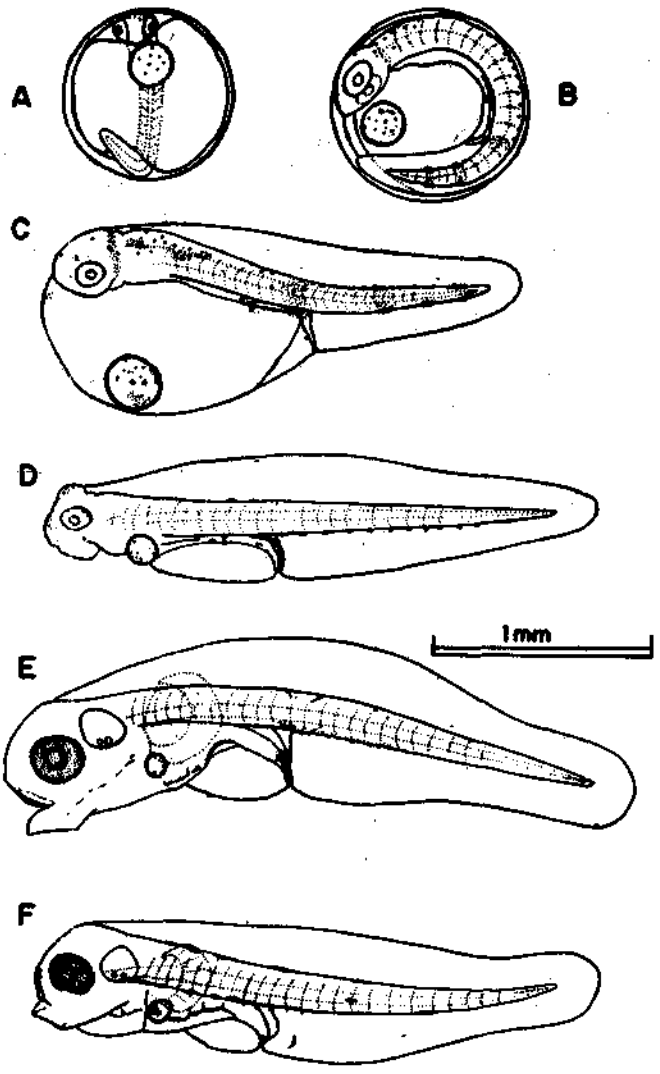

FIG. 1. Planktonic eggs, larvae and early postlarvae of *Valamugil seheli*. A and B: Eggs in two stages of development; C: Newly hatched larva; D: 24-hour-old larva; E: 48-hour-old postlarva; F: 72-hour-old postlarva.

present, of which 12 were preanal. Thus, the number of myomeres corresponded with the vertebral number of the adult (25), but their preanal-postanal disposition, being 12 and 13 instead of the 15 and 10 vertebrae of the adult, was differnet like in any other larval fish.

The 24-h old larva (Fig. 1, D) measured 2.507 mm. Significant changes observed in this stage were the almost complete utilisation of yolk, formation

of mid- and hindguts and migration of most of the black trunk pigments from the dorsal side to the ventral side. In the postanal region there was a series of black, branching pigment-groups. In the preanal region a few black pigments were present above the vent and in the midgut. Dorsally above the hindgut region two minute groups of black pigments could be seen. Along the dorsal and anterior aspects of the head similarly minute, branching black pigments were present. Oilglobule was still present with a few minute black pigments, but was much reduced. Number and disposition of the myomeres were same as in the previous stage.

The 48-h old stage measured 2.865 mm (Fig. 1, E). With the mouth formed, yolk fully utilized, pectoral fin developed and the eyes pigmented, the stage was in the early postlarval phase. The alimentary canal, which was under progressive development, showed minute black pigments along its ventral aspect as well as above and along the vent. Similar pigmentation was observed also along the ventral aspect of the postanal region, and there were three small pigment groups in the dorsal aspect. The number of myomeres had become definite, adding up to 25, of which 11 were preanal and 14 postanal.

The 72-h-old postlarva (Fig. 1, F), measuring 2.582 mm, was shorter than the previous stage by 0.283 mm. This reduction in length might be explained by the wide size range of the eggs; the larvae arising from a relatively small egg could also be relatively small, as was observed in another mullet *Mugil cephalus* by Ling (1970) in Taiwan and by Chaudhuri et al (1978) in India. In this stage pigmentation had increased much more than in the 48-h stage described above, both along the dorsal and ventral aspects of the body. Also, along the ventral aspect of alimentary canal there were more minute black pigmentation. Pectoral fin showed beginning of rays. Number and disposition of myomeres continued to be the same as in the previous stage.

Attempts to rear the postlargae for further stages were not successful.

Discussion

As pointed out by Natarajan and Patnaik (1973), Sebastian and Nair (1975), Chaudhuri et al (1978), Martin and Drewry (1978), and others, the distinguishing characters of the eggs of grey mullets are a narrow perivitelline space, unsegmented/nonvacuolated yolk, presence of a single oilglobule and the pigmentations of embryo and oilglobule. Compared to the eggs of some marine fishes like carangids, which have a narrow size range such as from 0.2 mm to 0.3 mm, the present eggs have a slightly wider range of variation, covering about 0.469 mm, as has been reported in the egg sizes of the mullet *Mugil cephalus* by Hotta (1955) in Japan, Ling (1970) in Taiwan and Chaudhuri et al (1978) in India.

Identification of the present eggs as those of *Valamugil seheli* is based on the above together with the simultaneous occurrences of spent adults of the species in local catches and eggs in plankton, and also on the distinct differences the present eggs and early larvae have shown from those of allied species. Chacko (1958) assigned some eggs which had granulated yolk and no oilglobule and an early larva which was opaque-white in colour to *M. seheli*, apparently wrongly, because clear yolk and presence of oilglobule in egg and transparency of early larvae are the characteristics of grey mullets (Natarajan and Patnaik 1973, Chaudhuri et al 1978, Martin and Drewry 1978).

Eggs of *Liza macrolepis* described by Natarajan and Patnaik (1973), Sebastian and Nair (1975) and Bensam (1983), being 0.633 to 0.73 mm in diameter, had size range less than that of the present eggs. They had oilglobules in the diameter range of 0.19 to 0.34 mm. Also, the newly hatched larvae of *L. macrolepis* measured only 1.3 to 1.5 mm and the oilglobule in the newly hatched larva was placed at the hind end of the yolksac, which are in marked contrast to the 2.179 mm length of the newly hatched larva and the ventrally placed oilglobule of *V. seheli*. Ahlstrom and Moser (1980) have pointed out that the size and position of the oilglobule in the yolksac of newly hatched larvae is of diagnostic value. The size ranges of eggs of *Liza tade* and *L. dussumieri* described by Bensam (1983) are also less than those of the present eggs, being 0.63 to 0.72 mm in the former and 0.53 to 0.7 mm in the latter and having oilglobules in the diameter ranges of 0.126 to 0.188 mm and 0.154 to 0.165 mm, respectively. Although the egg diameters of *L. tade* are found to overlap that of *V. seheli* now described, the oilglobules in the former were distinctly smaller. Considering the diameters of both eggs and oilglobules, the eggs of *L. dussumieri* were distinctly smaller than those of *V. seheli*. The eggs of another mullet *Mugil cephalus* described from India by Nair (1957) and Chaudhuri et al (1978) were about 0.8 mm in diameter and were with an oilglobule of 0.34 mm to 0.37 mm in diameter. Although diameter range of the present eggs overlaps the diameter range of the eggs of *M. cephalus*, the diameter range of the oilglobules in *V. seheli* is distinctly smaller, ranging from 0.212 to 0.273 mm only. Besides, the newly hatched larva of *V. seheli* can be distinguished from that of *M. cephalus* in that in the former the oilglobule occupies a ventral position of the yolksac, whereas in the latter it occupies a posteriodorsal position. From these subtle differences, the eggs and/or newly hatched larvae of *V. seheli* can be distinguished from those of allied species.

Another character that distinguishes the early larvae of *M. cephalus* from that of *V. seheli* is the nature of pigmentation. As reviewed by Martin and Drewry (1978), in the newly hatched larvae of *M. cephalus* reported from different parts of the world, thick stellate chromatophores are present all over the body in a dense manner, except in the posterior region. On the

other hand, in the newly hatched larva of *V. seheli* such stellate and dense pigmentation is absent; the pigmentation is punctate and is in the form of minute black spots, mostly along the dorsal aspect of the body, along with yellowish pigments. In this respect the early larvae of *V. seheli* resemble those of *Liza macrolepis* as described by Natarajan and Patnaik (1973), Sebastian and Nair (1975) and Bensam (1983), *Liza ramada* and *Chelon labrosus* as reviewed by Russel (1976), *Mugil curema* as reviewed by Martin and Drewry (1978) and *Liza tade* and *L. dussumieri* as described by Bensam (1983). Also, in the larvae and early postlarvae of *M. cephalus* (Russell 1976, Martin and Drewry 1978), a midlateral row of stellate melanophores is present. But, such a character is absent in the larvae and early postlarvae of *V. seheli*. In this respect the larvae of *V. seheli* resemble those of other grey mullets such as *Chelon labrosus, Liza macrolepis, L. dussumieri,* etc.

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