AN ACELLULAR PARASITE CAUSING MORTALITY OF PELAGIC FISH EGGS

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Planktonic eggs of some pelagic and neritic fishes collected at Madras, Mandapam and Porto Novo were found infected by an acellular parasite, which was found within the yolk of the eggs. The taxonomic identity of the parasite is under investigation. Intense infection was found to lead to the death of eggs as well as the newly hatched larvae. The incidence of infected eggs in the samples was 4% at Madras, 16% at Mandapam and 10.5% at Porto Novo.

Though eggs of marine fishes have been the subject of a variety of investigations the world over, so far, no parasite seems to have been reported to occur inside fish eggs except the eggs of the dinoflagellate *Ichthyodinium chabelardi* inside the yolk sac of the eggs of the South African pilchard *Sardinops ocellata* (Hollande and Cachon 1952). It is not unusual to find epizoic organisms living on the surface of the egg memberane. Many bacteria thrive on the surface of the egg membrane and are known to affect the eggs (Ahlstrom, 1948; Openheimer, 1953). The purpose of this communication is to place on record, the occurrence of an ancellular pathogenic organism inside pelagic fish eggs and to present certain observations on mortality of fish eggs caused by it. A fuller account of the parasite and its taxonomic identity will be published in due course. However, a brief description of the parasite is given below which will help in recognising it inside fish eggs and larvae. The observations were made during the author's investigations on fish eggs and larvae of the inshore waters of Madras, Mandapam and Porto Novo during the years 1951-53, 1954-57 and 1957-63 respectively.

The eggs were obtained from weekly samples of plankton collected in fifteen-minute surface hauls by a half metre diameter net made of organdie, towed from a catamaran between 0.600 and 07.00 hours. The fresh plankton sample was allowed to stand still in a glass trough for a few minutes and as many fish eggs as possible were pipetted out, keeping count of their number, into fingerbowls containing fresh sea water for detailed study. Estimates of the total number of eggs and infected eggs in the plankton samples were made on live material since the opacity of the yolk following preservation made it difficult to distinguish infected eggs from the uninfected ones. As the number of plankton samples varied from month to month, to make the estimates of abundance comparable, monthly averages were calculated from the values for the number of samples in each month.

Since the parasite was perfectly transparent and clearly visible through the egg membrane and yolk of live eggs, observations and camera-lucida sketches of the parasite were made *in situ* in living condition under a microscope. Permanent slides were prepared by fixing the smears in Schaudin's fluid for 30 minutes, rinsing in 70% alcoholic iodine, passing through lower grades to water, staining in Delafield's haematoxylin, destaining in acid alcohol, washing in alkaline water, upgrading through the alcohols and mounting.

Description — The parasite is transparent and, in its earlier stages of growth, is spheroid measuring 14 to 17.5 μ in diameter (Figs 1, 2A). There is a distinct ectoplasm formed by a narrow cytoplasmic layer containing several lipoid sphereules and other inclusions. The ectoplasm encloses a vastly vacuolated area with the endoplasm occurring as thin strands. A single nucleus is situated in the endoplasm, generally close to the periphery. As the organism

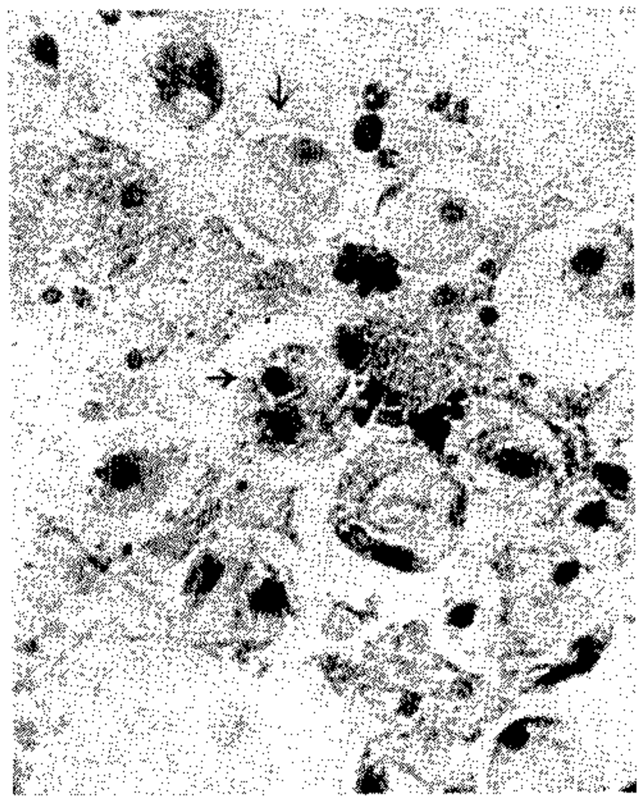

Fig. 1. Photograph of the yolk of a pelagic fish egg containing parasites, two of which are shown by arrows (X 900).

grows, its shape becomes polyhedral and distorted with smooth bulgings of the surface which subsequently become bulbous protruberances (Fig. 2 B, C).

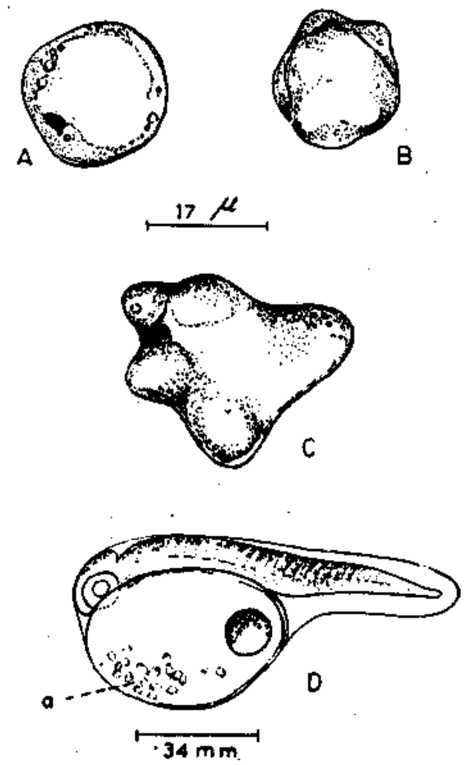

Fig. 2. A-C. Different stages of growth of the fish egg parasite. D. A carangid hatchling with yolk infected by the parasites (a).

Proliferation of the parasite, which is always found lodged within the yolk of pelagic fish eggs (Fig. 2D) is by binary fission. The infected egg continues its development without any visible signs of ill-health till its yolk is practically filled by the parasites and it dies. When the infection is less intense, the egg may hatch. But the larvae thus liberated dies as the yolk eventually gets filled by the parasites. The significance of this organism as a factor in the natural mortality of marine fishes is obvious.

It is surprising that this organism which any regular observer of live planktonic fish eggs would come across, has so far escaped detection. A possible explanation for this may be that these bodies are easily mistaken as normal costituents of the yolk.

Occurrence — The parasite was first seen in the yolk of *Thrissocles* eggs taken from the inshore surface plankton at Madras. Subsequently they were found to occur in the planktonic eggs of pelagic and neritic fishes, especially in the clupeoid and the carangoid types. But the eggs of flat fishes which occur along with the infected eggs were never seen to be parasitised. The data on incidence of infection are presented in Table 1. It was also found to occur in some of the planktonic fish eggs collected during 1970-71 at Kozhikode. It would appear from the table that Madras is the least affected area, though the data for each area pertain to different years.

TABLE 1. *Percentage of infected eggs recorded at Madras, Mandapam and Porto Novo*

Area	Madras	Mandapam	Porto Novo
Year	1951-53	1954-57	1957-63
Season	Dec-Apr	Feb-Jun	Feb-Jun
Number of eggs examied	3450	3331	6295
Infected eggs percent	4.0	16.0	10.5

From Figs. 3 and 4 which show the seasonal abundance of fish eggs, temperature of surface sea water and the percentage of infection at Mandapam[1]

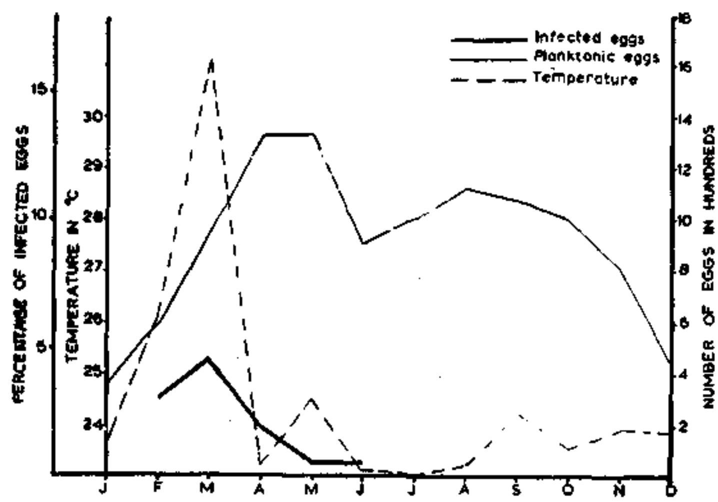

Fig. 3. Monthly averages of surface temperature, number of fish eggs collected by the surface tow net and the percentage of infected eggs in the latter in the Gulf of Mannar (Mandapam).

and Porto Novo, it is seen that the maximum infection was recorded at the climax of the spawning season of fishes and that it more or less follows the higher values of surface temperature.

1. Data on temperature and eggs, from Bapat (1955).

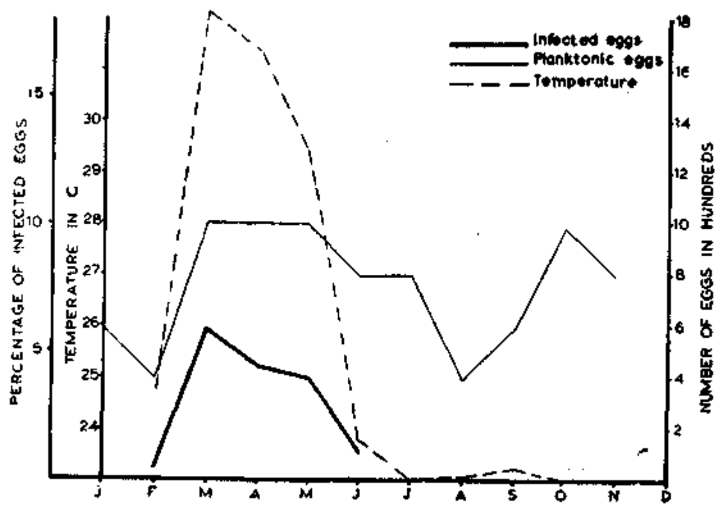

Fig. 4. Monthly averages of surface temperature, number of fish eggs collected by the surface tow net and the percentage of infected eggs in the latter at Port Novo.

Considering the mode of infection it is interesting that it is confined to the planktonic eggs of pelagic and neritic fishes while the eggs of flat fishes are uninfected although these eggs are also planktonic occurring along with the others and are subject to the same degree of exposure to infection as the others. Evidently, the organism is not transmitted from egg to egg. Rather, it would seem that the transmission of the parasite may be dependent on the habitat of the fishes concerned and perhaps congenital. Flat fishes being normally bottom dwellers could have escaped infection. However, there is no direct evidence for this. It may be recalled that so far two sporozoans, *Eimeria brevoortiana* (Hardcastle, 1944) and *Plistophora longifilis* (Schuberg, 1910) have been described from the gonads of teleosts. Thousands of male and female gonads of fishes were examined by the author without encountering any parasite except certain helminths being detected.

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