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GUIDELINES FOR THE IDENTIFICATION OF MARINE FISH EGGS

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Guidelines for identification may be considered under the following heads:

(1) Occurrences:

Occurrence of early developmental stages in the plankton and of spawners, spent, mature and/or recovering stages in fish catches can be used to identify the former as belonging to the latter only in a circumstantial manner. Delsman (1922-1938) has made use of such a method for assigning the early developmental stages; but, in addition to this he has also assigned cogent reasons of taxonomic nature in arriving at his conclusion. Thus, this circumstantial evidence of coincident occurrence of the eggs in the plankton and the spawning adults in the fishery can be only of limited value.

(2) Similarity with ripe ova:

Apart from the above guideline, another more valid guideline for identification of marine fish eggs is the similarities between the ripe ovarian ova of the parent and the planktonic eggs in the early stages of their development. In fishes such as Setipinna and Stolephorus the eggs, after extrusion in the water do not undergo increase in size due to hydration, as drawn attention to by Jones and Menon (1951 a). In such species, the size range of ripe ova and that of the planktonic eggs remain almost the same and hence the former is of great value to identify the latter. But, in other species like

Hilsa and Sardinella the eggs undergo hydration on coming into contact with water and as development progresses, thus altering the overall size of the planktonic egg from that of the ripe ovum (Jones and Menon, 1951 a). In the sardine Sardinops caerulea, Miller (1952) has found that the eggs diameter has increased from 1.15 mm at fertilisation to 1.64 mm after two hours and to a maximum of 1.83 mm at 10 hours after fertilisation. Although in such cases the overall diameter of the planktonic egg is different from that of the ripe ova, the diameter of the yolk remains the same as that of the ripe ova and is an useful guideline for identifying the eggs to the species to which these belong, as drawn attention to by Ahlstrom and Moser (1980).

(3) Egg Size:

According to Ahlstrom and Moser (1980), most of the marine fish eggs are in the size range of 0.6 to 1.6 mm in diameter. Bothid flat fishes are known to have small eggs of 0.5 to 0.8 mm; and pleuronectid flat fishes have large eggs of 4.0 to 4.5 mm and eels have still larger eggs of about 5 to 5.5 mm. In fishes like sardines and Anguilliformes, large sizes result due to hydration of the egg and progressive development of perivitelline space.

(4) Egg shape (Fig.10):

Planktonic eggs of vast majority of marine fishes are spherical, but there are some exceptions. For instance, the eggs of Stolephorus and certain Callionymus (Delsman, 1931) are ellipsoidal or globular (Fig. 10, A, B). Some eggs of Stolephorus, such as those of S. indicus and commersoni are provided with a knot at one pole. The eggs of certain gobioid fishes are attached to certain shells (Vijayaraghavan, 1973 b), somewhat ellipsoidal in shape, elongate and stumpy

and broader nearer the base (Fig.10,C). The attachment is by narrow, short hyaline fibres that are fused together forming a sucker shaped ring-like foot; these are also fused with similar structures of adjacent eggs.

(5) Chorion (Fig.10, D-H):

The outer egg capsule (also called egg shell, vitelline membrane, etc.,) in most marine fishes is smooth and unornamented. But, in certain groups of fishes it is ornamented such as Myctophiformes, Gadiformes, Pleuronectiformes, etc. The ornamentation may be in the form of a single swelling (or protuberance) as in some flat fishes (Fig.10, D) or in the form of an extensive honey comb-like polygonal network on the outer surface of egg membrane as in Chirocentrus (Delsman, 1923) (Fig.10, E), Saurida, flatfishes, etc. A less common type of ornamentation is spination (Fig.10, F), present on the eggs of Myctophiformes, certain exocoelids and allied fishes. In the demersal eggs of certain flying fishes adhesive filaments of 12-19 in number and of uniform size are present as in Cypselurus spilopterus (Vijayaraghavan, 1975, (Fig.10, G); and on the eggs of Hirundichthyes coramandelensis there are three distinct types of filaments (Vijayaraghavan, 1973a) (Fig.10,H).

(6) Inner egg membrane:

In most pelagic fish eggs, the chorion is the only egg capsule for the egg and an inner egg membrane is absent. But, in certain fish eggs, an inner egg membrane is present (Delsman, 1926). Ahlstrom and Counts (1958), the location of which may be either very close to the chorion or away from it (Fig.10,I).

(7) Yolk:

The yolk is the most dominant part of fish eggs, usually segmented or vacuolated in lower teleostean

groups such as clupeiformes but is homogeneous in most of the higher teleosts. The yolk is usually unpigmented; but in some groups it is pigmented as in certain Cynoglossus (Fig. 10, J).

(8) Oilglobule:

It may be absent in many species or groups as in Engraulidae, Cynodontidae, Gadidae, Pleuroneidae. If present, there may be only a single oilglobule as in many sardines; but the number may be many as in most Anguillaform eels, soleid and cynoglossid flatfishes, ranging from less than 10 to more than 50, the largest numbers being in most soleid flatfishes. Usually, the oilglobule is situated at the vegetal pole. It may be colourless usually, but in sardines it has a golden yellow colour. The single oilglobule may range in size from less than 0.1 to more than 1.0 mm in diameter. Usually, the oilglobule is unpigmented; but in the eggs of certain scombroids and Trichiurids, the oilglobule may be pigmented (Fig.10, K).

(9) Perivitelline space:

In most fish eggs which are "higher" in the group and which have a homogeneous yolk the perivitelline space is narrow, but in most fishes which are "lower" in the group and having vacuolated or segmented yolk, such as eels, clupeoid fishes, etc., a perivitelline space is present. Even in the latter category, a perivitelline space is absent to begin with (i.e. soon after spawned) but develops gradually, as observed by Miller (1952) in the Pacific sardine.

(10) Embryonic characters:

For the sake of convenience, Ahlstrom and Moser (1980) divide the embryonic development in the egg into three stages; (a) Early egg, from fertilisation to closure of blastopore (b) Middle Egg, from closure of

blastopore to the time when the tail begins to curve laterally away from the embryonic axis and (c) Late egg, from the time the tail is curved away from the embryonic axis to the time of hatching.

The pace of embryonic development differs from species to species group to group etc, because in some cases the embryo undergoes organogenesis even before the closure of blastopore (in early egg) while in others organogenesis takes place only in middle and late eggs. Pigmentation usually begins in middle eggs and reaches maximum in late eggs. Pigmentation may be present on the yolk and oilglobule also. Embryonic pigmentation is usually aligned along the dorsal margin of the body; and it is only after hatching the pigment migrate ventrally. But, in the case of the Japanese mackerel (Scomber japonicus), the ventral migration of the pigment takes place during the embryonic period itself. In the vast majority of marine fish eggs and larvae, the flexion of the caudal fin (notochord) and the formation of the fins take place only during larval/postlarval development. It is only in the eggs of flying fishes that flexion of the caudal fin and often the development of caudal anal and pelvic fin precedes hatching.

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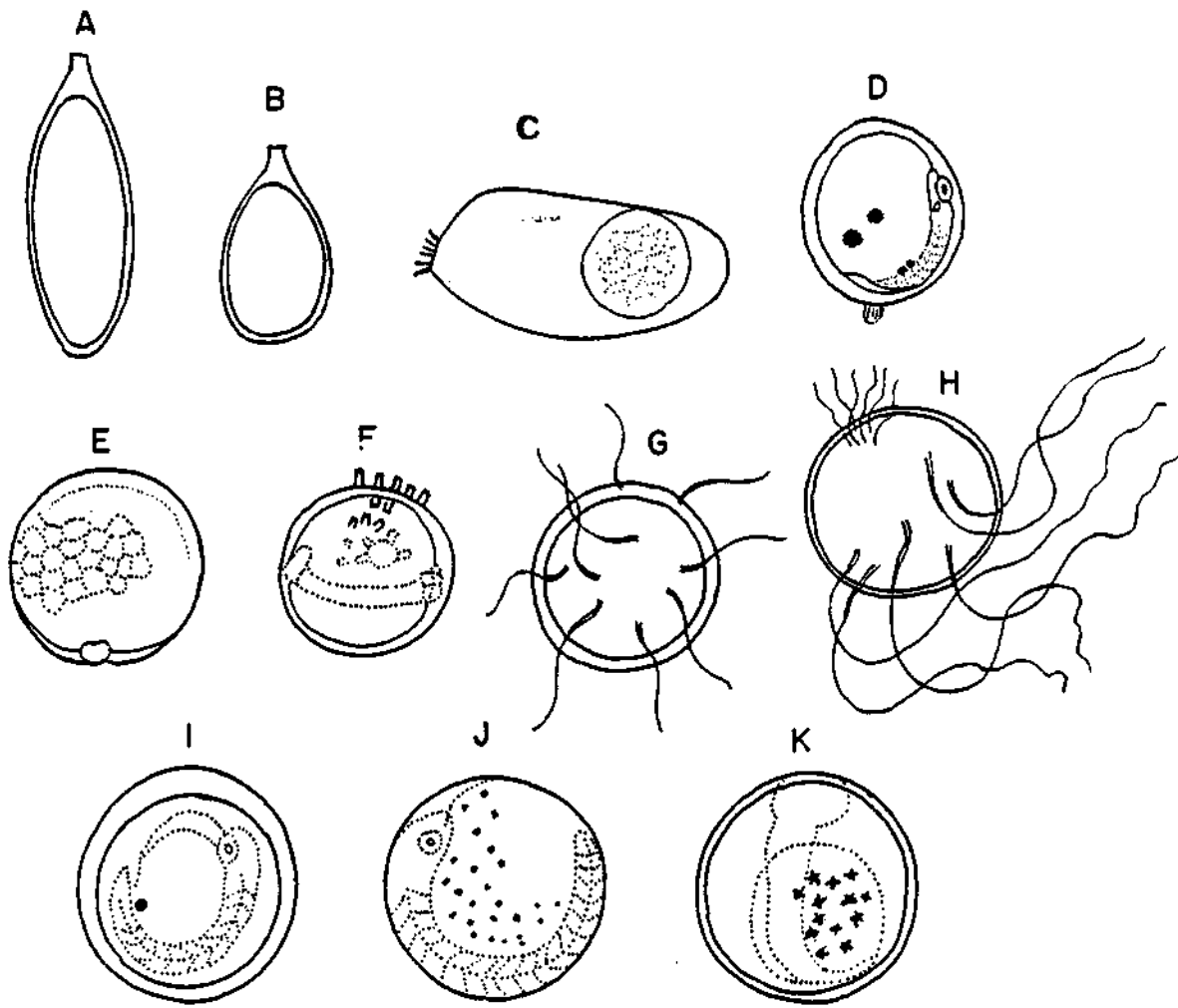


Fig.10