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Review Article

REPRODUCTIVE BIOLOGY IN FISHES AND ITS DIVERSIFIED PHYSIOLOGICAL MECHANISMS

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Abstract: Testes and ovaries compose the primary reproductive organs in fishes. Mostly, the gonadal structures remain paired and are of similar sizes, which remain partially or totally fused. Some secondary reproductive organs in fishes may remain present which increases its reproductive potency (Guimaraes-Cruz et al., 2005).

The structure of the testes in teleosts is majorly of two types in terms of spermatogonia production. Most commonly, the seminiferous tubules are the primary sites for spermatogonia which remain all along it, whereas the distal portions are the primary confinements in Atherinomorph fish. Cystic or semi-cystic spermatogenesis in relation to the release phase of the germ cells occurs in lumen of the seminiferous tubules in cysts (Guimaraes-Cruz et al., 2005).

Key words: fish; physiology; reproductive organs.

Introduction

Ovaries in fishes are of three types: gymnovarian, secondary gymnovarian or cystovarian. In gymnovarian, the oocytes pass through the coelomic cavity and gain entry in the ostium and then they get eliminated through the oviduct. In secondary gymnovarians the ova is shed from the ovaries in the coelom from where they are conveyed to the oviduct (Brito and Bazzoli, 2003). Oocysts are carried to exterior through the oviduct in Cystovarians. In lungfish, sturgeon, and bowfin the gymnovaries remain as primitive conditions. Cystovaries have the same characteristics like the teleosts where the lumen of the oviduct has continuity with the oviduct (Guimaraes-Cruz et al., 2005) in salmonids and a few other teleosts secondary gymnovaries remain present.

The development of oogonia in teleost fishes varies with the group and the dynamics in pattern of oogenesis highlights the fertilization and maturation processes in fish. The oocyte maturation process characterizes the variations in the ooplasm, nucleus and

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surrounding layers (Guimaraes-Cruz et al., 2005).

Postovulatory follicles are structures which are formed after the release of the oocytes and they do not possess endocrine function and are reabsorbed during the apoptosis of the follicular cells. Follicular atresia is a degenerative process which reabsorbs the vitellogenic oocytes which do not spawn. This process is less frequent in oocytes during other developmental stages (Guimaraes-Cruz et al., 2005).

Some hermaphrodite fishes like hamlets possess both testes and ovaries simultaneously at different phases of their life cycles.

Phisiological Diversity and Fertilization Patterns

Mostly all the fishes are oviparous in which the eggs develop outside the mother fish body (Brito and Bazzoli, 2003) and the male and female fishes eject their gametes outside their body in water. The examples include cichlids, tuna, salmon, goldfish and eels. In some oviparous fishes, internal fertilization occurs with the male using an intromittent organ to inject sperm into the genital tract of the female fish. Examples include sharks which are oviparous, like horn shark and ray fish like skates etc. The male fishes stay equipped with modified pelvic fins in pair, known as claspers.

Marine fish have the ability to produce huge numbers of eggs which get released in the open water. The average diameter of the eggs is 1 millimetre (0.039 in).

Larvae are the newly hatched youngs of oviparous fish. They remain poorly formed carrying a large yolk sac (for nourishment) and they differ in their appearance from juvenile and adult specimens. The larval period is relatively short (only several weeks) in oviparous fish. Larvae metamorphose in a very short duration of time to gain the size and appearance of juveniles. During this period of metamorphosis, larvae start feeding on zooplanktons and it also depends on the availability of the adequate density of zooplanktons.

In ovoviviparous fish the eggs develop inside the mother's body after internal fertilization. These receive very less nutritional supplement from the mother fish and they derive the nutrition from yolk source. The embryo develops inside the eggs. Angel sharks, guppies and coelacanths are some of the well known examples of ovoviviparous fish.

Even some fishes are viviparous also. In these, the eggs are retained by the mothers and nourishment is provided to the embryos. The viviparous fishes have the structure like the placenta of the mammals which connects the mother’s blood supply to the embryo. Lemon sharks, surf-perches and splitfins are the prominent examples of viviparous fish. The

viviparous fish also show oophagy in which the embryos which develop consume on other eggs produced by the mother fish. This is observed in the sharks, but some bony fish like halfbeak *Nomorhamphus ebrardtii* (Meisner and Burns, 1997) also exhibit such kind of behavior. Another uncommon type of vivipary include Intrauterine cannibalism in which the larger consumes the weaker embryos and smaller siblings in some fish like grey nurse shark, and also been reported for *Nomorhamphus ebrardtii* (Meisner and Burns, 1997).

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