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# Reproductive physiology

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# **Reproductive Physiology**

## **Importance of reproductive physiological studies**

**To develop coasts maturation under captive condition**

**To enhance sperm count and viability**

**Control of excess and undesirable spawning**

**Seasonality of spawning**



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# **Synchronous spawning**

## **The seed quality improvement**



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# Introduction

## Types of reproduction

3 types of reproduction are possible

Bisexual reproduction

Hermaphroditic reproduction

Parthenogenetic reproduction

Fishes are generally bisexual

sperms and eggs develop in separate individuals



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- The eggs and the sperms develop in the same gonad and self fertilization takes place.
- Synchronous or simultaneous hermaphroditism refers to the condition in which both parts of the ovo-testis mature at the same time.
- Successive hermaphroditism in which the fish undergoes sex reversal.
- Sequential or successive hermaphrodites are born with one sex and change sex sometime during the course of life.



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Parthenogenesis is the development of young without fertilization.

This is also called gynogenesis

Some species are unisexual

In unisexual species, there is no fusion of sperm and egg.



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# Sex determination



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# Male reproductive system

The reproductive organ consists of a pair of testes.

In most of the bony fish, the testes are whitish or creamy coloured, elongated, lobulate organs attached to the dorsal body wall by mesochoria.



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# Testis and spermatogenesis

Spermatozoa or sperm are formed from the germ cells via a series of developmental changes known collectively as spermatogenesis.

Spermatogenesis involves an initial proliferation of spermatogonia through repeated mitotic divisions and growth to form primary spermatocytes.



# Seasonal changes in testes

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Resting period

Preparatory period

Maturing period

Spawning period

Post spawning period



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# Female reproductive system

The female ovaries are paired but in some species one of the ovaries may be greatly reduced in size and become non functional.

In the elasmobranchs the ovaries are located anteriorly in the body cavity.

In many teleosts the ovaries are sac like, hollow paired structures that are continuous with the oviduct.



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# Oogenesis

Oogenesis is the earliest stages of the development of the female germ cells are similar to those seen in the initial stages of spermatogenesis.



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# Seasonal changes in the female reproductive organ

Resting period

Preparatory period

Maturing period

Spawning period

Post spawning period



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# Maturation and spawning

Testes and ovaries become mature after undergoing through well marked histomorphological alterations and increase in size.

- This is called maturation and the final expulsion of sperms or ova from the body into the surrounding water is called “spawning” followed by fertilization.
- Maturation and spawning period varies in different species and even in the same species collected from different places.



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# Ovulation and fertilization

The follicle ruptures and the egg escapes from the aperture. This is called **ovulation**.

Fish ovaries may be of three types: gymnovarian, secondary gymnovarian and cystovarian.



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# Modes of reproduction

## **Live bearers/ internal bearers**

Most sharks give birth to live young, but some release eggs that hatch later

## **Ovi-ovoviviparous**

## **Ovo-viviparous or Aplacental Viviparity**

## **Viviparous**

## **oviparous, or "egg-laying"**



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# Seasonal regulation of reproduction/ environmental influence on the reproductive cycle



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# Hormonal control of reproduction

Hormones of pituitary gland play a major role in reproduction.

Pituitary release gonadotropin hormones which control growth of testes and ovary in fishes.

The primary hormones that regulate sex and reproduction are the sex steroids such as androgens, estrogens and progesterone which have masculinizing, feminizing and gestational effects.