**Insect Reproduction system**

**By**

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**INTRODUCTION**

“Reproduction is a biological process by which new individual organisms (off-springs) are produced from their parents”. ***OR***

“The sexual or asexual process by which organisms generate new individuals of the same kind”.

Reproduction is a fundamental feature of all known life. Each individual organism exists as a result of reproduction.

**TYPES OF REPRODUCTION**

There are two types of reproduction

1. Asexual reproduction
2. Sexual reproduction

**Asexual reproduction:**

In asexual reproduction, an organism can reproduce without the involvement of another organism. Asexual reproduction is not limited to [single-celled organisms](https://en.wikipedia.org/wiki/Unicellular_organism). The [cloning](https://en.wikipedia.org/wiki/Cloning) of an organism is a form of asexual reproduction. By asexual reproduction, an organism creates a genetically similar or identical copy of itself.

**Sexual reproduction:**

Sexual reproduction typically requires the sexual interaction of two opposite sexed individuals of a same species. Male individual mates with female of same species. Sperms are transferred from male to female. Sperms fertilize the egg in female’s body and zygote development starts.

In this reproduction, by meiosis gametes are produced which contain half the number of [chromosomes](https://en.wikipedia.org/wiki/Chromosome) of normal cells.

**REPRODUCTION IN INSECTS**

Insects have different & opposite sexes and reproduce by sexual reproduction. In this process, first step is the location of one sex by the other. This may involve the visual, auditory and olfactory senses. When male insects locate the opposite sex, they show courtship behavior to attract the female. This courtship includes visual displays, ritualized movements, sound production, tactile stimulation, nuptial gifts & specific flashes in firefly.

When male wins the female then copulation takes place. Finally, during copulation, insemination of the female occurs. Insemination involves the transfer of sperm from male to female, in order to fertilize the egg present in female’s body.

**TYPES OF REPRODUCTION IN INSECTS**

Generally, insects have following types of reproduction

1. **Oviparity**

This is the most common mode of reproduction in insects. The insects lay the fertilized eggs, which hatch outside the body of the female. Such insects are said to be oviparous. E.g. Butterflies, Moths, Flies, Beetles, Bugs, Locusts, Grasshoppers, Dragonflies, Mayflies, Springtails, Bristletails etc.

1. **Viviparity**

The eggs complete their embryonic development & hatch within the body of the female. Hence the female gives birth to the young. The insects having this type of reproduction are called viviparous.

E.g. Aphids, certain flies, Stylopids etc.

1. **Parthenogenesis**

The females lay the unfertilized eggs, which have the haploid (half) or diploid (double) number of chromosomes. These eggs undergo full development & give rise to males, females or both sexes.

E.g. Aphids, Bees, Wasps, Some whiteflies, Thrips etc.

1. **Paedogenesis**

When immature stages, such as larvae & pupae, start reproducing parthenogenetically, it is called Paedogenesis. In some cecidomyids (*Miastor & Oligarces*) the larvae gives birth to other larvae, which become adult under favorable conditions. In certain midges (*Henria & Tanytarsus*) the pupa produces larvae, some of which become the normal adults. A few beetles (*Micromalthus*) also show this phenomenon.

1. **Polyembryony**

When a single egg produces two or more larvae, it is known as polyembryony.

E.g. several parasitic wasps, some cecidomyids & a few stylopids.

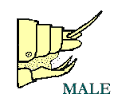
1. **Hermaphroditism**

It is an extremely rare phenomenon in which an individual has both the male & female reproductive organs. In the scale insect (*Icerya purchasi*) the outer cells of the gonads (undifferentiated testis or ovaries) produce eggs, while the inner one gives rise to sperms. Thus the eggs are fertilized in the gonads by sperms in the same individual. In the Phorid flies of the genus *Termitostroma* each individual has a pair of ovaries & testis to release the eggs & sperms.

**SEXUAL ORGANS IN THE MALE & FEMALE INSECTS**

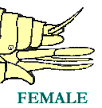
**Male Reproductive organs**

1. Paired testis composed of follicles (testicular tubes)
2. Paired vasa deferentia
3. Vesiculae seminales
4. Median ejaculatory duct
5. Accessory glands
6. Mesadenia
7. Ectadenia
8. ----------
9. Genitalia



**Female Reproductive organs**

1. Paired ovaries composed of ovarioles (ovarian tubes)
2. Paired oviducts
3. Egg-calyces
4. Common oviduct & vagina
5. Accessory glands
6. ----------
7. Colleterial glands
8. Spermatheca
9. Bursa copulatrix
10. Ovipositor



**REPRODUCTIVE SYSTEM**

It is a system in living organisms body in which process of reproduction takes place. It should be studied separately in both male & female sexes.

**Male Reproductive system:**

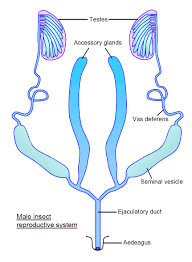
The male reproductive system consists of a pair of **testes**. These testes are closely associated into a single yellow structure which generally lies on the midgut of the alimentary canal.

Give a longitudinal cut with a blade along its mid-dorsal line to separate it into two parts. Each testis is composed of a large number of tubular **testicular follicles**. Each follicle opens by means of a short, slender duct, the **vas** **efferens** (pl. vasa efferentia), into the long genital duct, the **vas deferens** (pl. vasa deferentia).

The follicles are attached to the body wall by a **suspensory ligament**. The vasa deferentia run posteriorly to open into a wider tube, the ejaculatory duct, below the ventral nerve cord.

Just anterior to the points of opening of vasa deferentia, two groups of long tubular **accessory glands** also open into the ejaculatory duct. A medial pair of these glands becomes fairly dilated to serve as **seminal vesicles** (vesiculae seminales) for storing the sperms.

The ejaculatory duct opens posteriorly into a large pouch-like structure, the **ejaculatory sac**, which opens into the **aedeagus** (part of external genitalia).

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**Female Reproductive system:**

The female reproductive system consists of a pair of **ovaries**. These ovaries are closely associated into a single body which lies on the midgut and a part of the hindgut.

Also separate it into two component parts by giving a longitudinal cut along its mid-dorsal line. Each ovary is composed of a large number of **tubular ovarioles** which arise from the side of the oviduct.

The ovarioles end in thread-like filaments which unite to form a suspensory ligament by which they are attached to the body wall. The **oviducts** also extend anteriorly to form two **accessory glands**. Then the oviduct run posteriorly and after making a short bend unite into a fairly dilated common oviduct **(vagina)** below the ventral nerve cord. The vagina terminates in the **genital chamber**.

The **spermatheca** is a sac-like oval body which receives and stores the sperms. It opens by means of a coiled **spermathecal duct** into the genital chamber. The latter ends into an egg-guide which is situated between the ventral valves of the **ovipositor** (part of external genitalia).

