

REPRODUCTIVE SYSTEM

In insects male and female sexes are mostly separate. Sexual dimorphism is common where the male differ from the female morphologically. e.g. bee, mosquito and cockroach. The other types are

Gynandromorph: (Sexual mosaic) Abnormal individual with secondary sexual characters of both male and female. e.g. mutant **Drosophila**.

Hermaphrodite: Male and female gonads are in one organism. e.g. Cottony cushion scale.

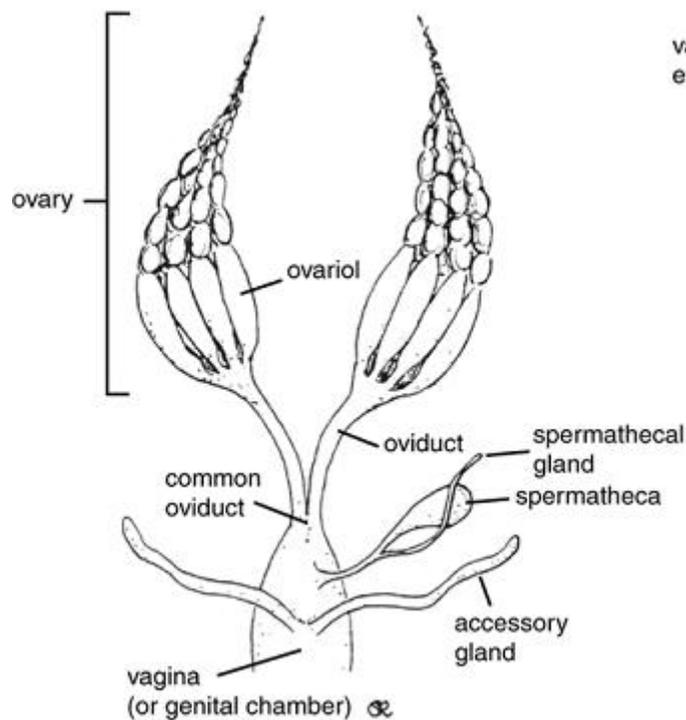
FEMALE REPRODUCTIVE SYSTEM

The main function of the female reproductive system are egg production and storage of male's spermatozoa until the eggs are ready to be fertilized. The basic components of the female system are paired **ovaries**, which empty their mature **oocytes** (eggs) via the **calyces (Calyx)** into the **lateral oviduct** which unite to form the common (**median**) **oviduct**. The **gonopore** (opening) of the common oviduct is usually concealed in an inflection of the body wall that typically forms a cavity, the **genital chamber**. This chamber serves as a copulatory pouch during mating and thus is often known as the **bursa copulatrix**. Its external opening is the **vulva**. In many insects the vulva is narrow and the genital chamber becomes an enclosed pouch or tube referred to as the **Vagina**.

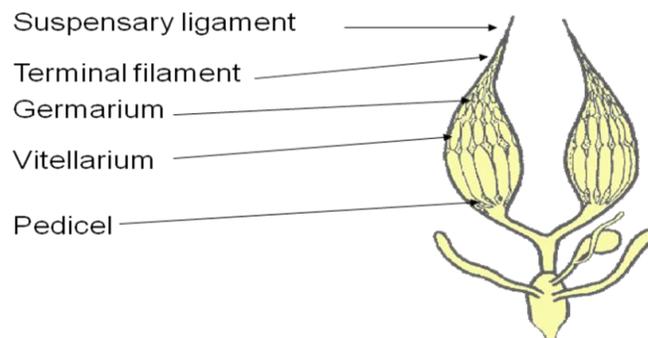
Two types of ectodermal glands open into the genital chamber. The first is the **spermatheca** which stores **spermatozoa** until they are needed for egg fertilization. The spermatheca is single and sac-like with a slender duct, and often has a diverticulum that forms a tubular **spermathecal gland**. The gland or glandular cells within the storage part of the spermatheca provide nourishment to the contained spermatozoa.

The second type of ectodermal gland, known collectively as **accessory glands**, opens more posteriorly in the genital chamber.

Each ovary is composed of a cluster of egg or ovarian tubes, the **ovarioles**, each consisting of a **terminal filament**, a **germarium** (in which mitosis gives rise to primary oocytes), a **vitellarium** (in which oocytes grow by deposition of yolk in a process known as vitellogenesis) and a **pedicel**. An ovariole contains a series of developing oocytes each surrounded by a layer of follicle cells forming an epithelium (the oocyte with its epithelium is termed a follicle), the youngest oocytes occur near the apical germarium and the most mature near the pedicel.



The different types of ovariole is based on the manner in which the oocytes are nourished.



(i) Paniostic ovariole: Lacks specialized nutritive cells so that it contains only a string of follicles, with the oocytes obtaining nutrients from the haemolymph via the follicular epithelium. e.g. Cockroach.

Ovarioles of the other two contains trophocytes (nurse cells) that contribute to the nutrition of the developing oocytes.

(ii) Telotrophic ovariole: (Acrotrophic) The trophocytes are confined to the germarium and remain connected to the oocytes by cytoplasmic strands as the oocytes move down the ovariole, e.g. bugs.

(iii) Polythrophic ovariole: A number of trophocytes are connected to each oocyte and move down the ovariole with it, providing nutrients until depleted, thus individual oocytes alternate with groups of smaller trophocytes. e.g. moths and flies.

Accessory glands of the female reproductive tract are often called as **colleterial** or **cement glands**, because their secretions surround and protect the eggs or cement them to the substrate. e.g. **egg case** production in mantis, **ootheca** formation in cockroach, **Venom** production in bees.

Structure of egg

Chorion

Vitelline membrane

Micropyle

Periplasm with yolk

MALE REPRODUCTIVE SYSTEM

The main functions of the male reproductive system are the **production and storage** of spermatozoa and their transport in a viable state to the reproductive tract of the female. Morphologically, the male tract consists of paired **testes**, each containing a series of testicular tubes or follicles (in which spermatozoa are produced) which open separately into the mesodermally derived sperm duct or **Vas deferens** which expands posteriorly to form a sperm

storage organ or **seminal vesicle**. Tubular paired **accessory glands** are formed as diverticula of the vasa deferentia. Sometimes the vasa deferentia themselves are glandular and fulfil the functions of accessory glands. The paired vasa deferentia unite where they lead into the ectodermally derived **ejaculatory duct** (the tube that transports the semen or the sperm to the gonopore).

Accessory glands are 1-3 pair, either mesodermal or ectodermal in origin and associated with vasa deferentia or ejaculatory duct. Its function is to produce seminal fluid and spermatophores (sperm containing capsule).

