

Reproduction of Animals

Types of Reproduction

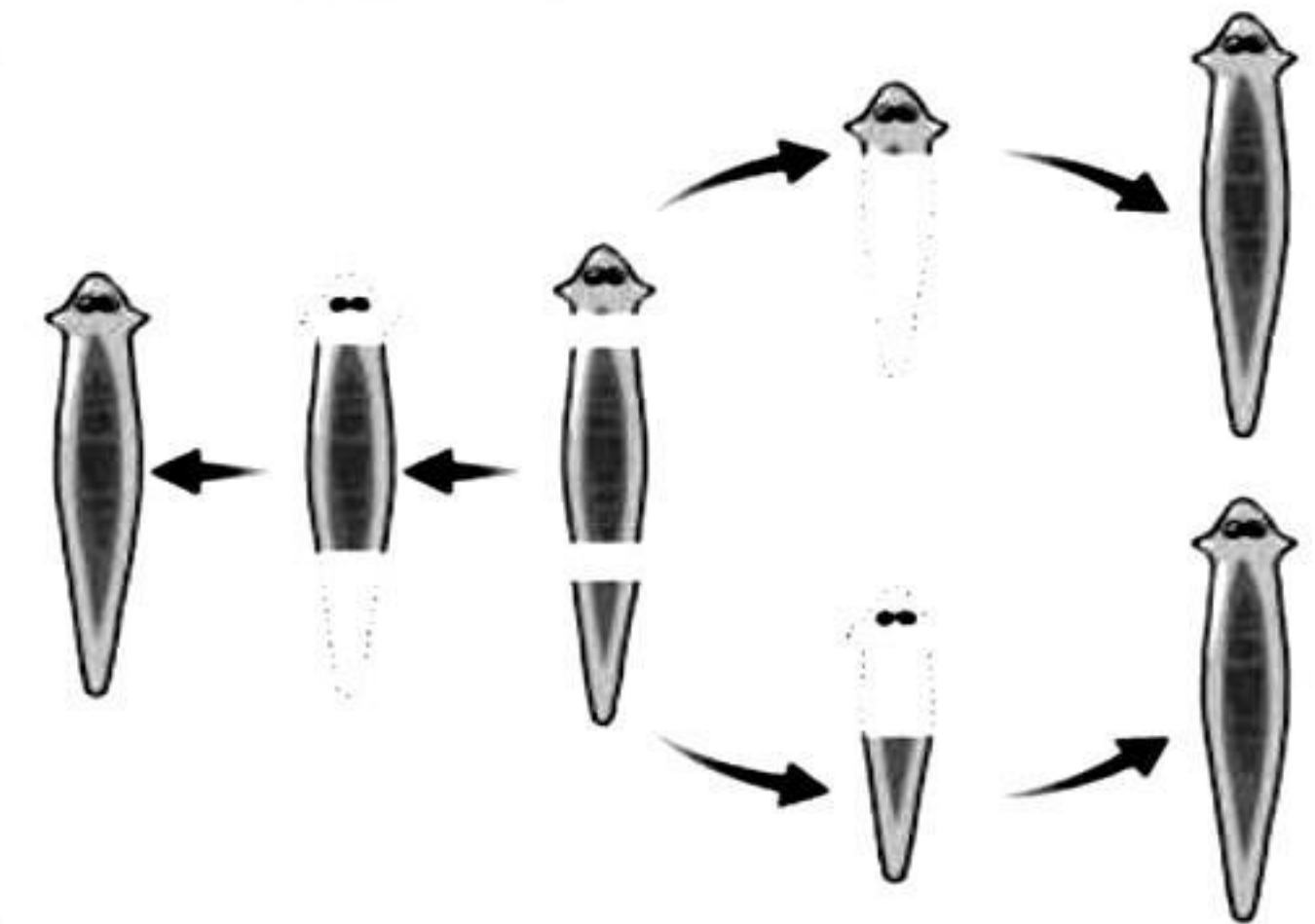
- (i) Asexual reproduction
- (ii) Sexual reproduction

Asexual reproduction

- In this method a single individual (parent) is capable of producing offsprings. As a result the offsprings produced are not only identical to one another but are also exact copies of their parent.
- They are similar morphologically and genetically, therefore, can also be termed as clones. Asexual reproduction is common among single celled organisms, and in plants and animals with relatively simple organizations.
- Different types of asexual reproduction that occurs in animals are:

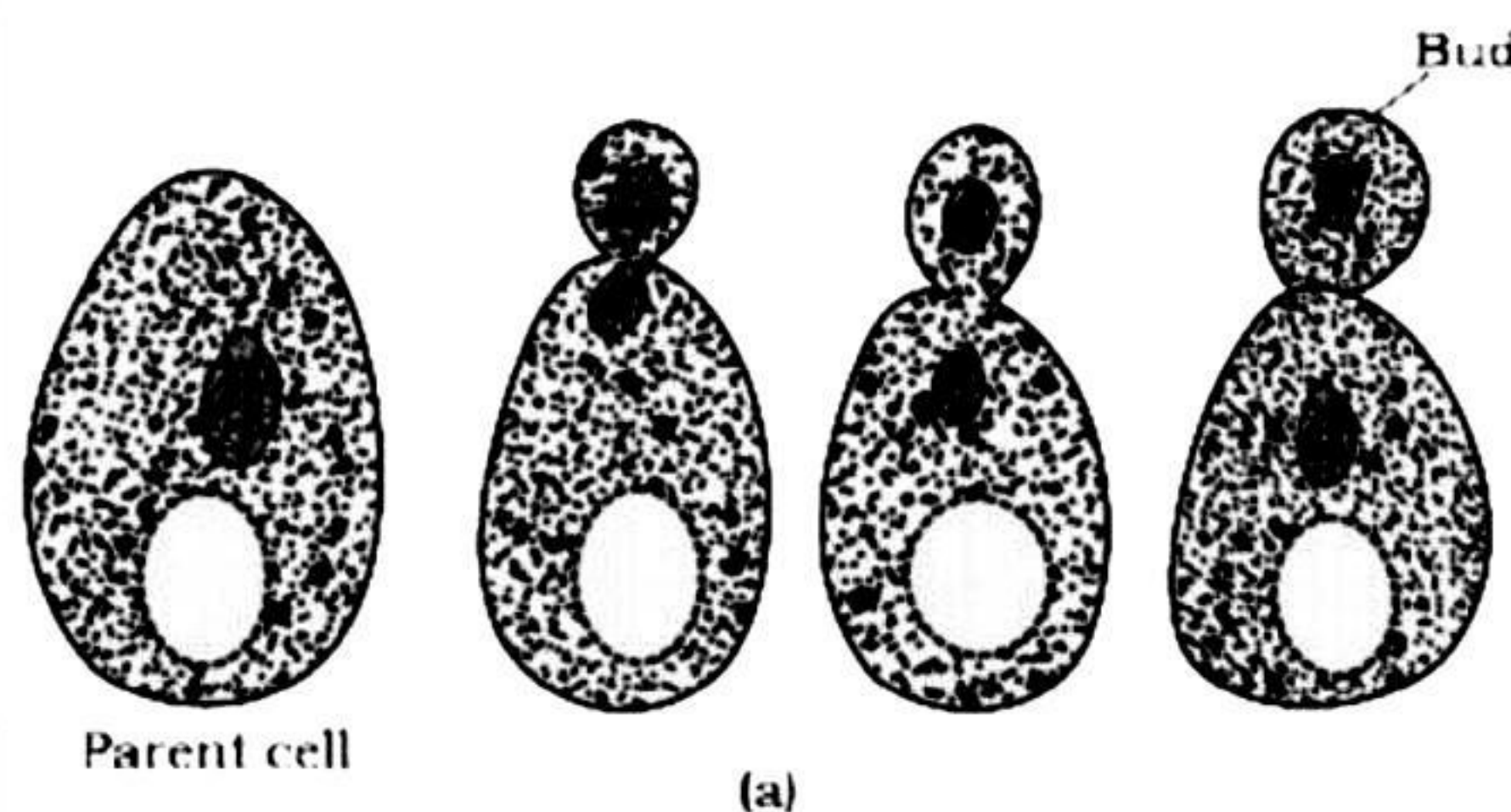
(a) Regeneration:

- It is exhibited by echinoderms, coelenterates, planarians, wherein if a part of the body breaks or becomes detached, it can grow and develop into a completely new individual.



(b) Budding:

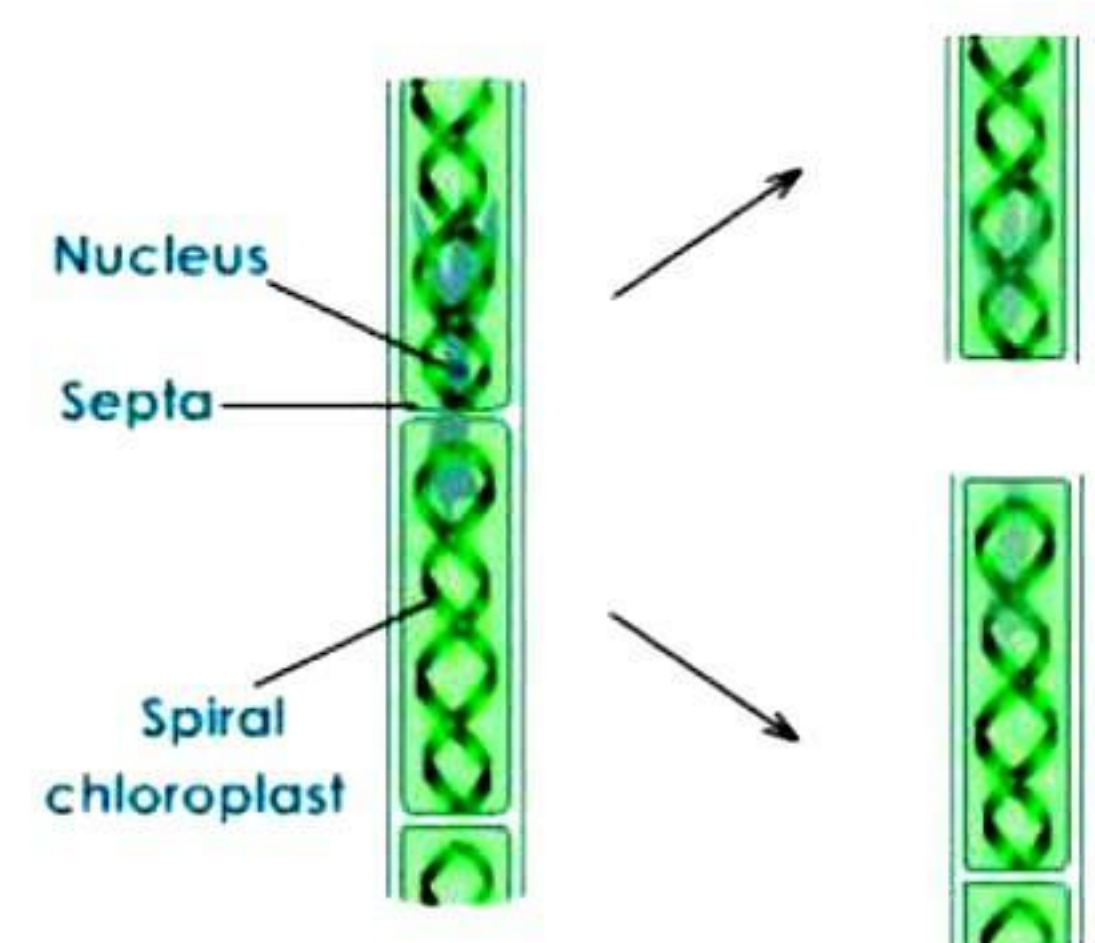
- In budding, an offspring grows out of the body of parent. Buds may remain attached initially to the parent body but eventually get separated and matures into new organism. It occurs in both single celled and multicellular organisms. E.g; *Hydra*, *Yeast* etc.



Budding in Yeast
Budding in Hydra

(c) Fragmentation –

- In this type of reproduction, the body of the parent breaks into distinct piece, each of which can produce an offspring. Planarian and *Spirogyra* exhibit this type of reproduction.



(d) Binary fission:

- It is a kind of cell division which occurs in single celled organisms such as bacteria and protozoa. In fission the parent cell simply divides into two equal parts, each of which develops into a new organism.

Fragmentation in *Spirogyra*

(e) Parthenogenesis:

- In this type of reproduction, development of unfertilized egg takes place into a complete individual.

Animals like most kinds of wasps, bees and ants reproduce by this process. Even in some lizards and birds (turkey), the female gamete undergoes development to form new organism without fertilization.

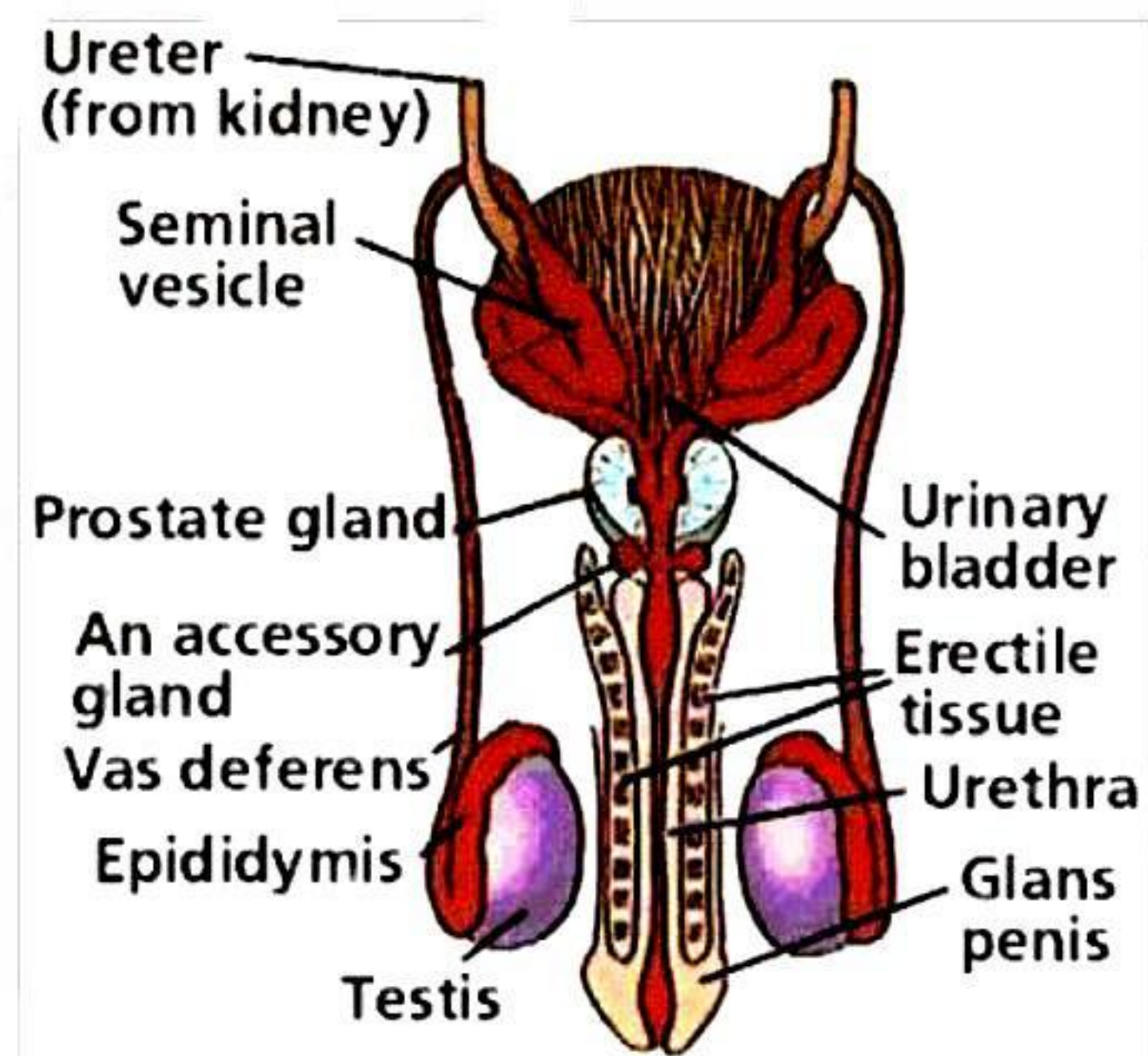
Sexual Reproduction

- In this type of reproduction fusion of two distinct gametes take place. Each parent contributes one gamete with only one set of chromosomes (haploid). The fusion of two gametes forms the zygote, having genes from both the parents.
- Thus the resulting offspring inherits a mixture of genes from both the parents. In most cases the male gamete is called **spermatozoa**, which is motile with a flagellum like structure which helps in its movement. On the other hand, female gamete called the **ovum**, relatively much larger in size than the male gamete and is non motile.

Reproductive System in Human Beings

Male Reproductive System

- The function of male reproductive system is to provide male gamete for fertilization of the ovum.
- The male reproductive organs are.
 1. A pair of testes
 2. Epididymis
 3. Vas deferens
 4. Urethra
 5. Penis
 6. Accessory sex glands:
 - (i) Seminal vesicles
 - (ii) Prostate gland

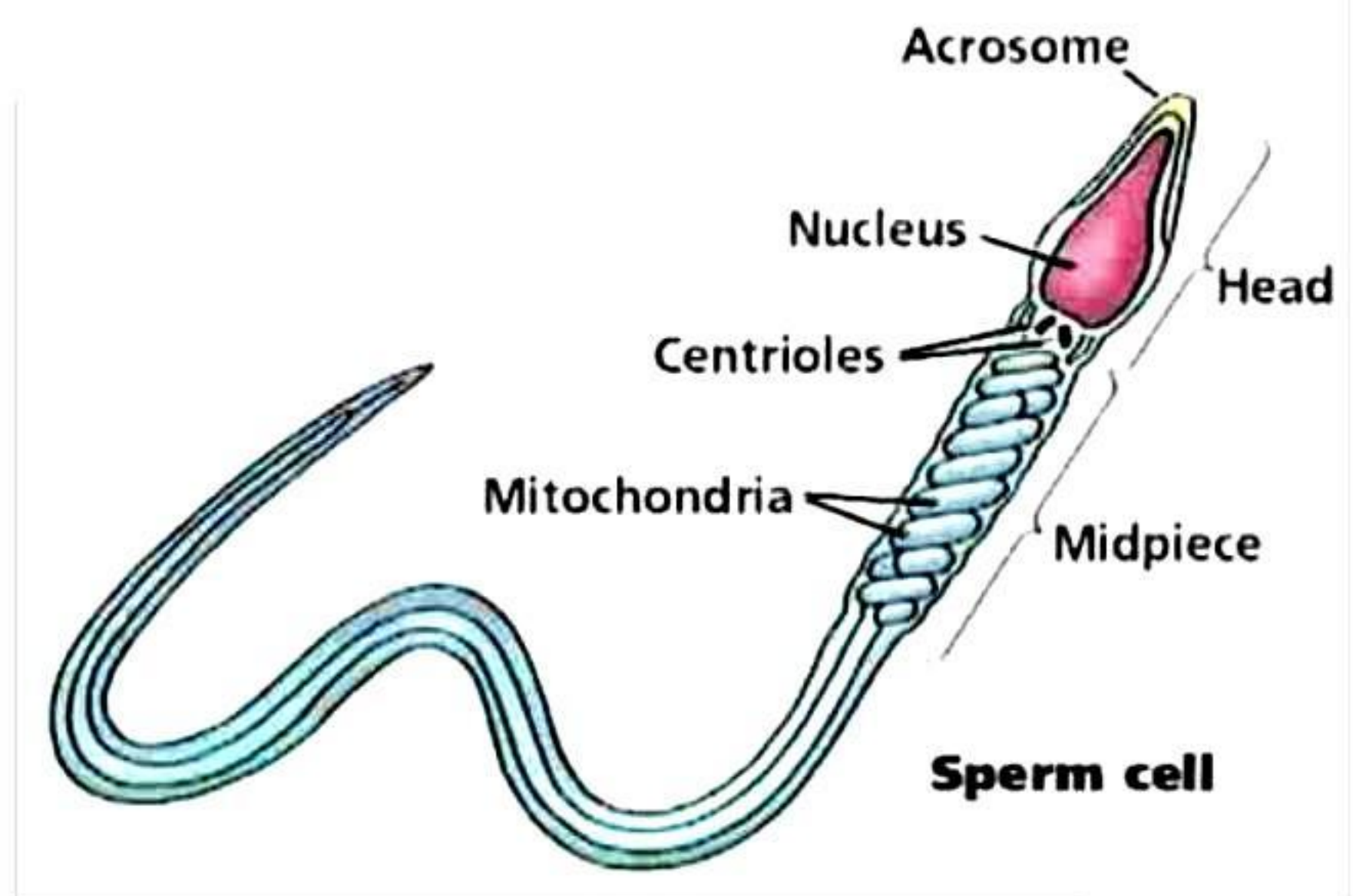


- Production of sperms takes place in the testes which are located in a pouch called **scrotum**, outside the body. Through sperm duct or vas deferens, sperms are transported inside the body.
- Semen is the mixture of sperms and secretions from seminal vesicles, prostate, cowper's and urethral glands. It is a milky fluid. Its average amount is 2-3 ml in a single ejaculation and contains 200,000,000-400,000,000 sperms.

- The sperms mature within the epididymis which is a small tubular knot fitting like a cap on the upper pole of the testis. The interstitial cells (Leydig cells) present in testis produce the male sex hormone, testosterone which is responsible for secondary sexual characters in males.

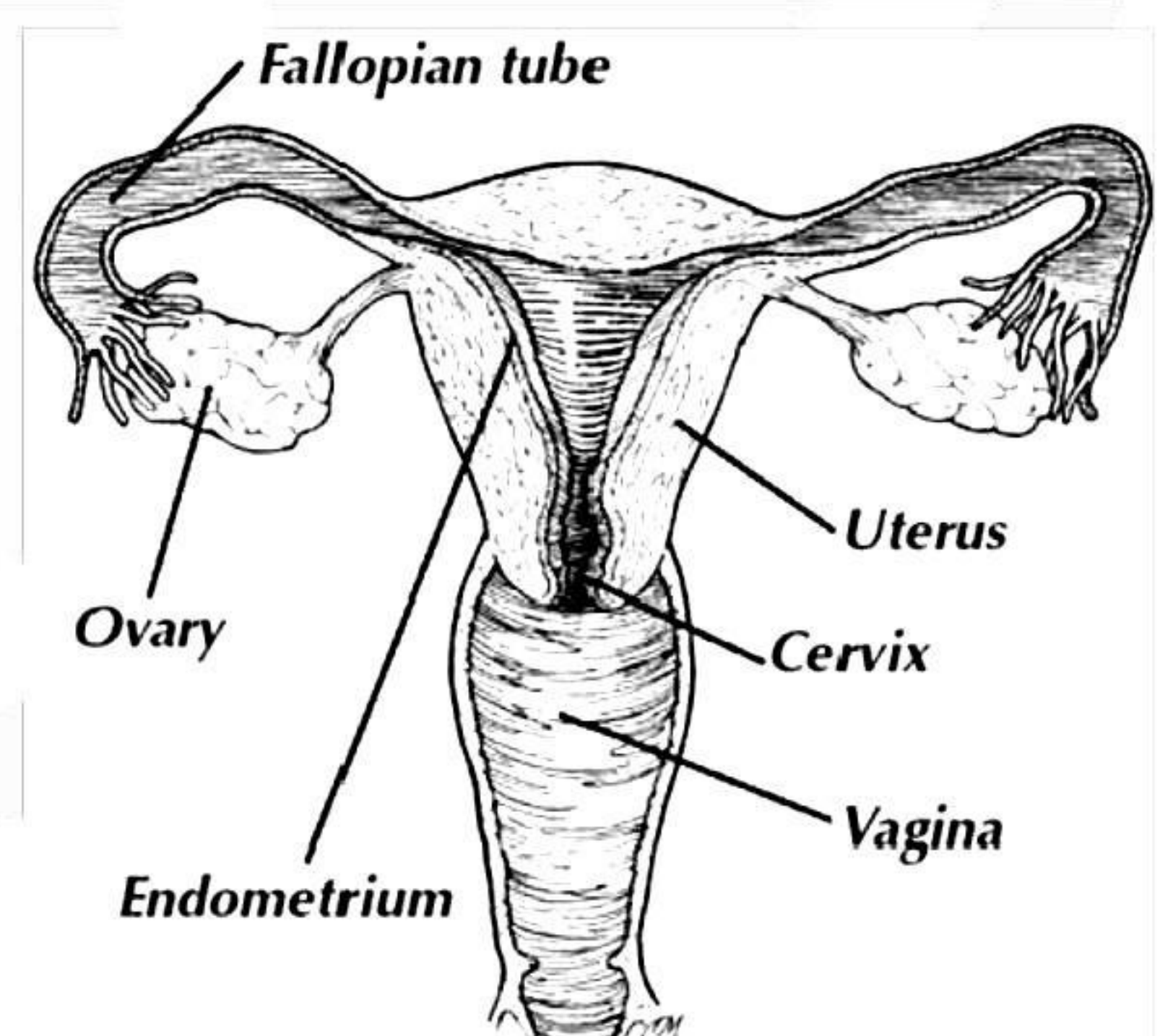
Structure of Sperm

- The sperm cell is composed of three main parts: the head, mid piece and tail.
- The head contains a cap like structure called as acrosome, and the nucleus, which contains all hereditary information needed to successfully reproduce, once the sperm cell has fertilized an egg.
- The head is used to penetrate the egg.
- The mid piece contains several of mitochondria which are essential for the sperm to successfully survive on its journey to the female egg.
- The flagellating tail propels the sperm cell, moving as quickly as possible to reach the egg.
- The acrosome at the top of the head of the sperm secretes an enzyme called *hyaluronidase* which facilitates entry of the sperm into the egg by dissolving the wall of the ovum. The acrosome is made out of the golgi apparatus of the cell.
- The mitochondria contained in the middle piece, provide energy (ATP) for the activity of the sperm to swim. The tail makes lashing movements for propulsion.



Female Reproductive System

- Female reproductive system has two functions. The first is to produce egg or ovum, and the second is to protect and nourish the embryo/ fetus until birth.
- The female reproductive system includes –
 1. A pair ovaries
 2. A pair of oviducts (fallopian tubes)
 3. Uterus
 4. Vagina
- Ovaries release mature ovum, which passes through the fallopian tube into the uterus. If the ovum is fertilized by the sperm, it attaches to the wall of the uterus and the foetus develops. In human beings, a single mature ovum is released by one of the ovaries every month.
- Process of release of mature ovum from the ovary is termed as **ovulation**.



- In females, after ovulation, the released egg is picked up by fimbriae (cilia) of oviducal funnel of the oviduct. The remnant of the ruptured follicle persists for some time to convert into a yellow mass called corpus luteum.
- It secretes two essential female sex hormones, *Oestrogen* and *Progesterone*. These hormones are responsible for secondary sexual characters in females.
- The inner lining of uterus called as endometrium alternately gets thickens and disintegrates during the female menstrual cycle

Fertilization

- The process of fusion of the nucleus of male gamete (sperm) and female gamete (ovum) is called fertilization. This process form a single celled structure with two sets of chromosomes (diploid), termed as **zygote**.
- Zygote contains the complete genetic information to develop into a new organism having characteristics of both the parents. Zygote undergoes process of development to finally form a complete organism.

Metamorphosis

- Metamorphosis is a process in which an animal undergoes significant changes in the physical appearance as they go through various developmental stages, during embryonic development.
- Animals that commonly undergo metamorphosis are insects and amphibians. Some species of fish also undergo metamorphosis.
- In amphibians, which lay their eggs in water, the fertilized eggs develop into larvae known as tadpoles. A tadpole looks like a fish with a tail and no legs, it also breathes through gills. As tadpole metamorphoses into adult stage, they lose their gills and tail, develop lungs and legs.
- Therefore, externally tadpole larvae appear very different from adult frogs.
- Similarly, insects that undergo complete metamorphosis go through four developmental stages – egg, larva, pupa and adult. All these stages are morphologically very different from each other.

Oviparous and Viviparous Animals

- Based on whether the development of the zygote takes place outside the body of the female parent or inside, to give birth to the young ones, animals are divided into two categories-
- **Oviparous animals:** In oviparous animals like reptiles and birds, the fertilized eggs get covered by a hard shell and are laid in a safe place in the environment. After a specific incubation period the young ones hatches out.

- **Viviparous animals:** In these animals like majority of mammals including human beings, the zygote develops into young one inside the body of the female organism.
- After attaining a certain stage of growth, the young ones are delivered out of the mother's body. Because of proper embryonic care and protection, the chances of survival of young ones are greater in viviparous animals.

Difference between viviparous and oviparous animals:

Sr. No	Oviparous animals (Egg bearing animals)	Viviparous animals (Live - bearers)
1.	Animals that lay eggs outside their body.	Animals that give birth to young ones
2.	Development of embryo does not take place within the mother's body.	Embryos develop inside the mother's body from which it gains nourishment.
3.	Examples, Chicken, frogs and butterfly	Examples, Human beings certain fishes etc.