

Chapter: Human Reproduction

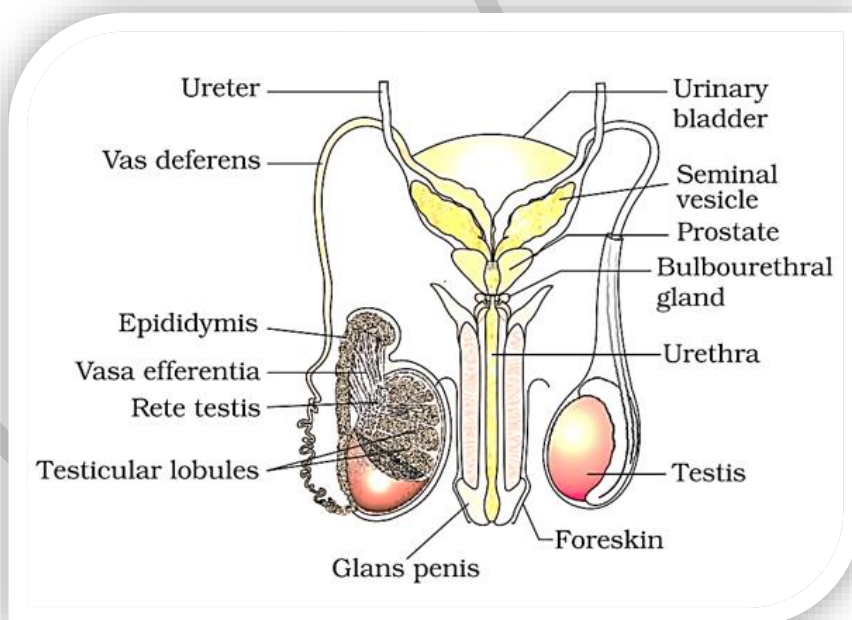
Exercise

Question 1. FILL IN THE BLANKS:

- Humans reproduce sexually.
- Humans are viviparous.
- Fertilization is internal in humans.
- Male and female gametes are haploid.
- A zygote is a diploid.
- The process of release of the ovum from a mature follicle is called ovulation.
- Ovulation is induced by a hormone called the luteinizing hormone.
- The fusion of male and female gametes is called fertilization.
- Fertilization takes place in the Fallopian tube.
- The zygote divides to form a blastocyst, which is fertilization implanted in the uterus.
- The structure which provides a vascular connection between the fetus and uterus is called the placenta.

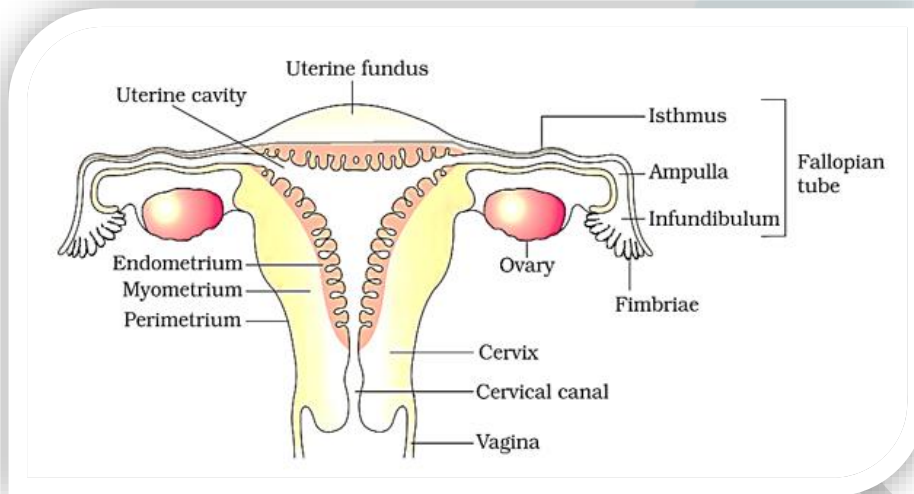
Question 2. Draw a labeled diagram of the male reproductive system.

Answer:



Question 3. Draw a labeled diagram of the female reproductive system.

Answer:



Question 4. Write two major functions each testis and ovary.

Answer:

Functions of the testis:

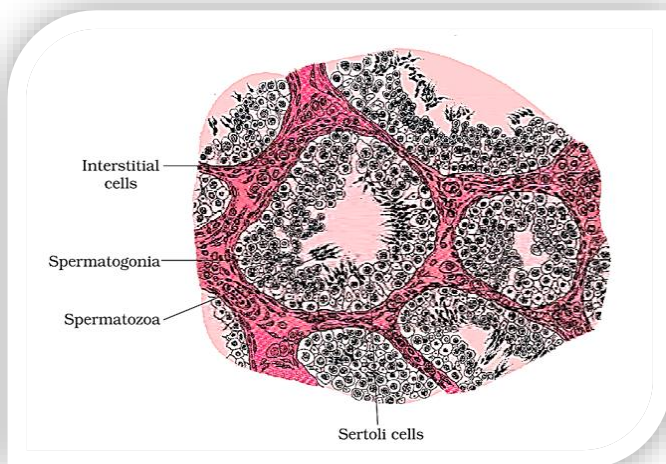
- Testes produce the primary male sex hormone which is called testosterone.
- It produces sperm.

Functions of the ovary:

- Ova is a female gamete that is produced by the ovary.
- The ovary produces sex hormones called progesterone and estrogen.

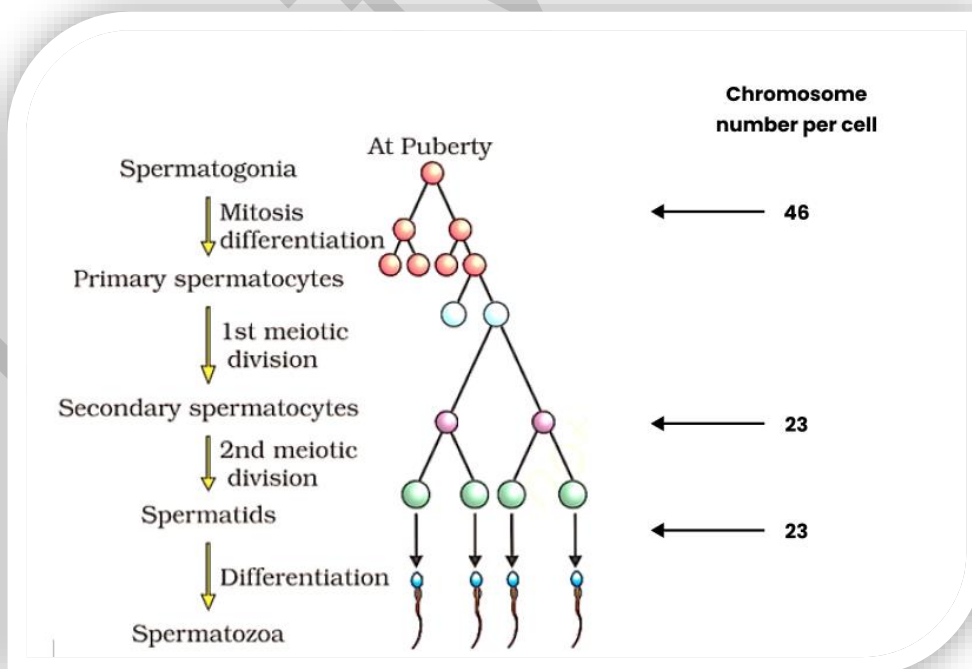
Question 5. Describe the structure of a seminiferous tubule.

Answer: The seminiferous tubules are a highly coiled structure that is responsible for the production of sperm in the testes. These seminiferous tubules are located in testes. Each of them tubules is lined on the inner side of the germinal epithelium. It's lined by two types of cells i) spermatogonia which are make germ cells, which produce primary spermatocytes through meiotic cell divisions, and ii) Sertoli cells which are called nurse cells of the testes because they provide nourishment to the germ cells. In the process of meiotic cell division, primary spermatocytes from secondary spermatocytes and in the end spermatids. After the process of metamorphosis, spermatids change into male gametes which are called spermatozoa. In seminiferous tubules, there are large polygonal cells which are called interstitial cells (Leydig cells), located just adjacent to seminiferous tubules. Leydig cells secrete the male hormone which is called testosterone.



Question 6. What is spermatogenesis? Briefly describe the process of spermatogenesis.

Answer: The process of the production of sperm from immature germ cells of males is called spermatogenesis. It occurs in seminiferous tubules which are present in testes. In the process of spermatogenesis male germ cells (diploid spermatogonia) increase the size to form a diploid primary spermatocyte and this primary diploid spermatocyte undergoes first meiotic cell division. In the process of meiosis I there is a reduction division that forms two equal haploid secondary spermatocytes. Each of the secondary spermatocytes undergoes meiosis II which provides two equal haploid spermatids, hence there are four haploid spermatids. These spermatids transform into sperms or spermatozoa and the whole process is called spermatogenesis.



Question 7. Name the hormones involved in the regulation of spermatogenesis.

Answer: There are two hormones involved in the regulation of spermatogenesis namely, Follicle-stimulating hormone (FSH) and luteinizing hormone (LH). The secretion of these two hormones is stimulated by gonadotropin-releasing hormones which are released from the hypothalamus. Both these hormones are involved in spermatogenesis.

Question 8. Define spermatogenesis and spermiation.

Answer:

Spermatogenesis:

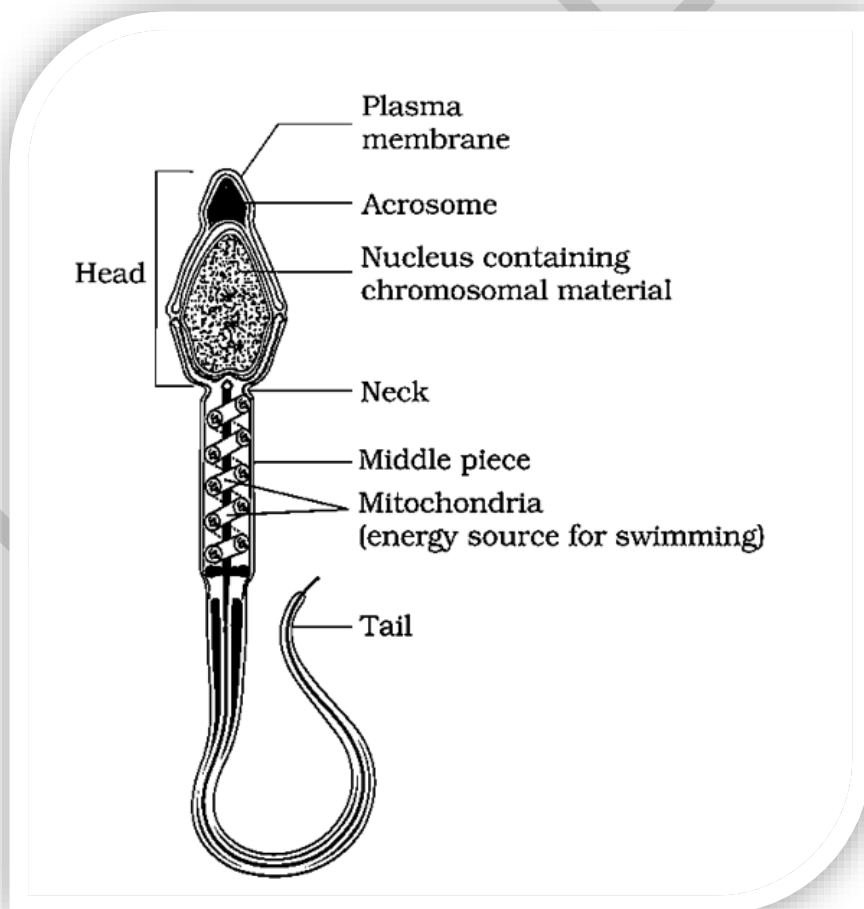
The process of the production of sperm from immature germ cells of males is called spermatogenesis. There is 3 phase of spermatogenesis which are- proliferation and differentiation of spermatogonia, meiosis, and spermatogenesis. This process occurs inside the seminiferous tubules.

Spermiation:

The process of releasing sperms from seminiferous tubules, which are left embedded in the Sertoli cells (after spermiogenesis) is called spermiation.

Question 9. Draw a labeled diagram of sperm.

Answer:



Question 10. What are the major components of seminal plasma?

Answer:

Seminal plasma and sperms are involved in the production of semen. In the male reproductive system mucus, spermatozoa, and different secretions of accessory glands are major components of seminal plasma. Seminal plasma is rich in fructose, calcium, ascorbic acid, and some enzymes, these components provide nourishment to the sperms.

Question 11. What are the major functions of male accessory ducts and glands?

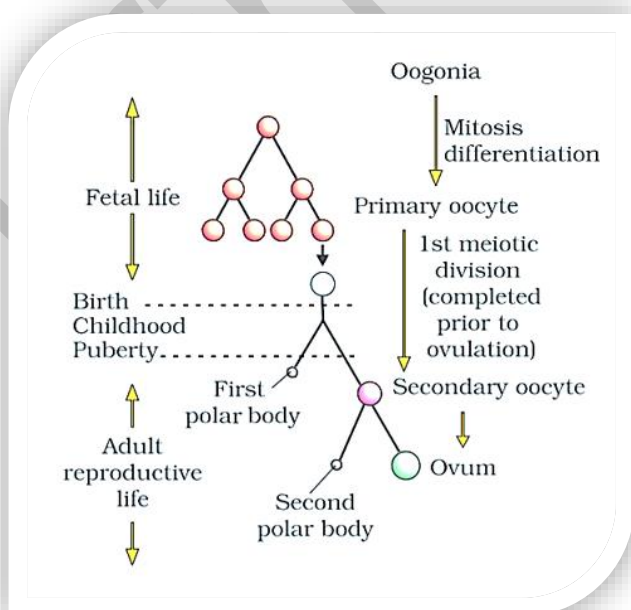
Answer:

The accessory ducts and glands are responsible for the secretion of various hormones and fluids. They provide an important role in the transport and storage (temporary) of the sperms. During ejaculation, the male accessory ducts serve to collect spermatozoa and transport them to outside the urethra. There are many male accessory glands, which are the seminal vesicles, prostate glands, and bulbourethral glands. These glands are responsible for the secretion of fluids that lubricate the reproductive system and sperms. The sperms get diffused in this fluid which makes its transportation easier into the female body. The fluid provides nutrients and activates sperm secretion.

Question 12. What is oogenesis? Give a brief account of oogenesis.

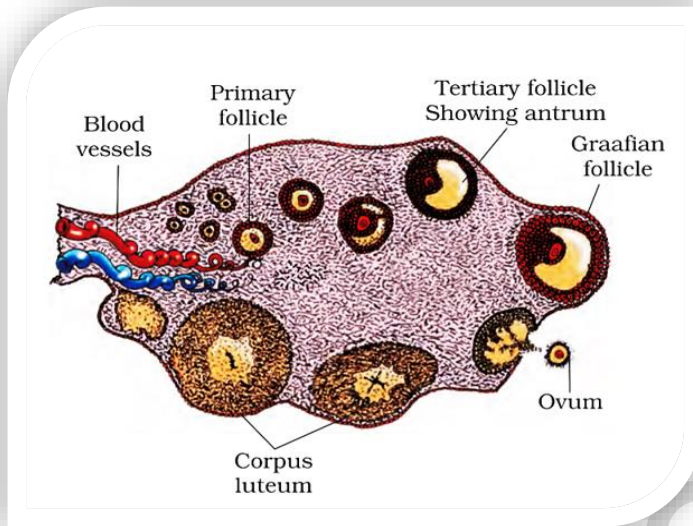
Answer:

The process in which the formation of mature ovum occurs from the oogonia in females is called oogenesis, this process takes place in ovaries. During this process, a diploid oogonium (egg mother cell) increases in size and transforms into a diploid primary oocyte. This primary diploid oocyte goes through meiosis I cell division to form two unequal haploid cells. The smaller-sized cell is called the first polar body and the larger-sized cell is called the secondary oocyte. The secondary oocyte goes through meiosis II and gives rise to a second polar body and an ovum. In the process of oogenesis, a diploid oogonium produces a single haploid ovum but two or three polar bodies are produced.



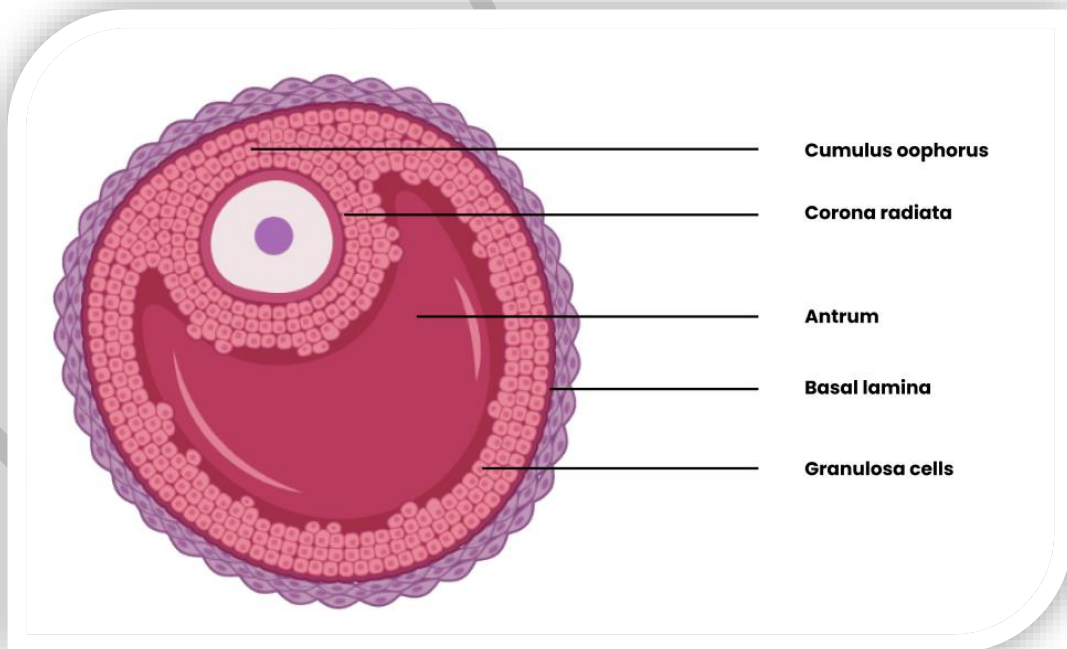
Question 13. Draw a labeled diagram of a section through the ovary.

Answer:



Question 14. Draw a labeled diagram of a Graafian follicle?

Answer:



Question 15. Name the functions of the following:

- (a) Corpus luteum
- (b) Endometrium

- (c) Acrosome
- (d) Sperm tail
- (e) Fimbriae

Answer:

- a. **Corpus luteum:** The corpus luteum forms in an ovary and is responsible for the production of the hormone progesterone in the early stage of pregnancy. The function of the corpus luteum depends on whether or not fertilization occurs. It secretes estrogens and progesterone, these hormone causes changes in the uterus which make it more suitable for implantation of the fertilized ovum and the nourishment of the embryo.
- b. **Endometrium:** Endometrium prepares the uterus for pregnancy by going through cyclic changes. It is the innermost layer of the uterus, it has many glands which undergo many cyclic changes in various phases of the menstrual cycle for embryo implantation.
- c. **Acrosome:** A cap-like structure present in the anterior part of the head of the sperm. It has a hyaluronidase enzyme, which is responsible for hydrolyzing the outer membrane of the egg, in that way it helps the sperm to penetrate with the egg at the time for fertilization.
- d. **Sperm tail:** It is the longest part of the sperm which helps in the movement of the sperm inside the female reproductive tract. It is a locomotory organ of the sperm.
- e. **Fimbriae:** It is present at the end of the ovarian end of the fallopian tube and looks like a finger-like structure. After the process of ovulation, they help in the collection of the ovum and draw it into the fallopian tube.

Question 16. Identify True/False statements. Correct each false statement to make it true.

- (a) Androgens are produced by Sertoli cells. (True/False)
- (b) Spermatozoa get nutrition from Sertoli cells. (True/False)
- (c) Leydig cells are found in the ovary. (True/False)
- (d) Leydig cells synthesize androgens. (True/False)
- (e) Oogenesis takes place in the corpus luteum. (True/False)
- (f) Menstrual cycle ceases during pregnancy. (True/False)
- (g) Presence or absence of a hymen is not a reliable indicator of virginity or sexual experience. (True/False)

Answer:

- a) Androgens are produced by Sertoli cells. (**False**)
Androgens are produced by Leydig cells which are present in seminiferous tubules of the testes but not by Sertoli cells.
- b) Spermatozoa get nutrition from Sertoli cells. (**True**)
- c) Leydig cells are found in the ovary. (**False**)
Lydig cells are found in seminiferous tubules of the testes but not in the ovary.
- d) Leydig cells synthesize androgens. (**True**)
- e) Oogenesis takes place in the corpus luteum. (**False**)
The process of oogenesis takes place in the ovary but not in luteum.
- f) The menstrual cycle ceases during pregnancy. (**True**)
- g) The presence or absence of a hymen is not a reliable indicator of virginity or sexual experience. (**True**)

Question 17. What is the menstrual cycle? Which hormones regulate the menstrual cycle?

Answer:

In the female primates, the reproductive cycle is called the menstrual cycle. The menstrual cycle on average takes 28 days to complete in human females. It first starts at puberty, it is repeated at an interval of 28 days. One menstrual event to another menstrual event is called the menstrual cycle. The end of this cycle included by breaking of uterine endothelium, which comes out in the form of blood and mucous through the female vagina.

Various hormones regulate the menstrual cycle which is a follicle-stimulating hormone (FSH), luteinizing hormone (LH), estrogen, and progesterone. FSH secretes the influence of RH (releasing hormone).

Question 18. What is parturition? Which hormones are involved in the induction of parturition?

Answer:

When the development of the fetus is completed in the womb of its mother, the process of giving birth to that baby is called parturition. There are two different hormones involved in the process of parturition which is oxytocin and relaxin. Both hormones are responsible for different purposes, oxytocin is responsible for the contraction of smooth muscles of the myometrium of the uterus. The relaxin is responsible for the relaxation of pelvic ligaments and preparing the uterus for childbirth.

Question 19. In our society, women are often blamed for giving birth to daughters. Can you explain why this is not correct?

Answer:

Humans have 28 pairs of chromosomes, which are responsible for different qualities of humans. Males have 22 pairs of autosomes and they have one or two sex chromosomes, X or Y. But female has 22 pairs of autosomes and they have only X (sex) chromosome. The sex of the baby is determined by the type of gametes X or Y which are present in males and these gametes fuse with the X chromosome of the female. If the fertilization sperm is X, then the gender of the baby will be a girl, and if the fertilization sperm of Y, then the gender of the baby will be a boy. So the sex of the child depends upon the male but not on the female(woman).

Question 20. How many eggs are released by a human ovary in a month? How many eggs do you think would have been released if the mother gave birth to identical twins? Would your answer change if the twins born were fraternal?

Answer:

Every month one egg is released by either of the two ovaries. Twins are produced from a single egg by separation of early blastomeres because of the first zygotic cleavage which separates the egg into two. Because of this, the identical twins formed and they have the same genetic makeup, they have the same physical features and because of this, they are called identical twins.

If the twins are fraternal, that means they grow up with two separate eggs. When two eggs come from each ovary and are then fertilized by two separate sperms. So the child will have different genes and different physical features, and because of this, they are also called non-identical twins.

Question 21. How many eggs do you think were released by the ovary of a female dog which gave birth to 6 puppies?

Answer:

Dogs are polyovulatory species, in these types of species, more than one ovum is released by the ovary at the time of ovulation. So, six eggs were released by the ovary of a female dog to produce six puppies.

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