EXPERIMENT

AIM

To study and identify stages of gamete development from T.S. of testis and T.S. of ovary through permanent slides.

MATERIAL REQUIRED

Permanent slides of T.S. of testis and T.S. of ovary.

THEORY

Reproduction in mammals occurs mainly through sexual mode. The sex cells involved in the process of sexual reproduction are termed as gametes. The process of formation of gametes is termed as Gametogenesis.

This is of two types:

(i) Spermatogenesis, i.e., the formation of male gametes (sperms).

(ii) Oogenesis, i.e., the formation of female gametes (Ova). The sperm and ova are haploid, as they are produced by the process of meiosis in testis (in males) and ovary (in females) respectively.

During spermatogenesis, the speremato gonia arise from geminal epithelial cells through mitosis. These are diploid cells which undergo mitosis to form primary spermatocytes. These divide by meiosis to produce secondary spermatocytes. Again secondary spermatocytes divide to form daughter spermatids.
The next process of spermiogenesis results in conversion of spermatids into sperms.

Ovum matures inside the ovarian follicle. The immature ovum is surrounded by a layer of epithelial cells. At the time of birth, about 40000 follicles are present in the ovary. But only 400 mature during the reproductive period. These grow in size while maturing. Such follicles are classified as primary follicles, secondary follicles and Graafian follicles (fully mature).

PROCEDURE

1. First, clean the slide and microscope with the help of lens cleaning paper and cleaning fluid.
2. Fix the slide on the stage of microscope.
3. Observe the slide of testis and ovary first under the lower magnification and then under higher magnification.
4. Now, draw labelled diagrams as seen in the sections of both testis and ovary.

OBSERVATIONS

T.S. of Mammalian Testis Shows:

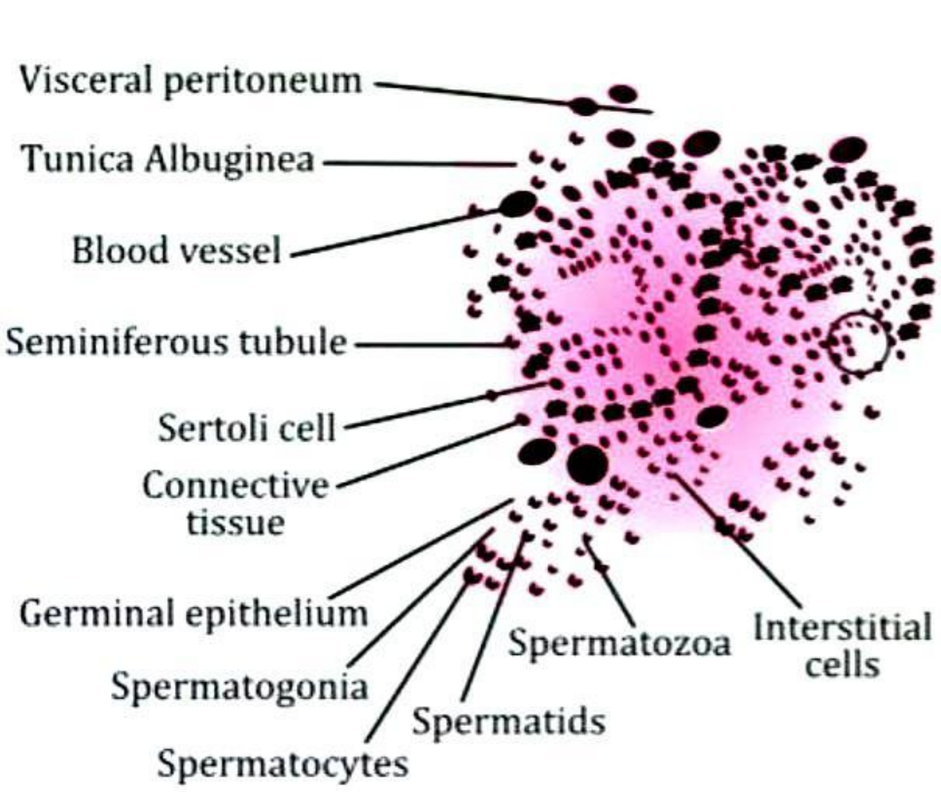
1. Testis is covered by thick fibrous tissue called tunica albuginea.
2. It contains many seminiferous tubules embedded in interstitial tissue.
3. Various germinal cells are seen in seminiferous tubules in the following order from periphery towards

lumen in different layers.

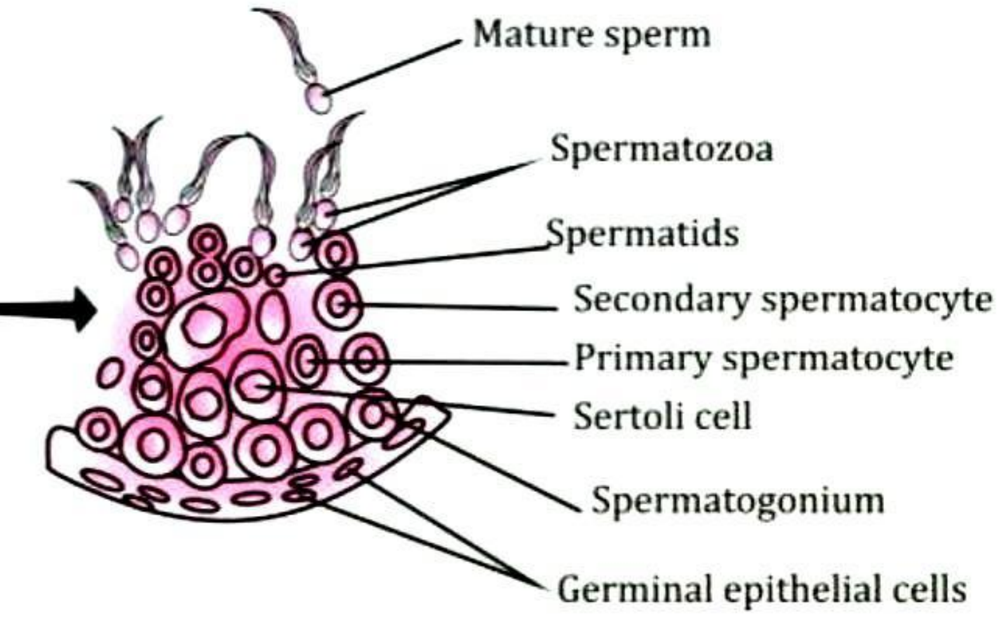
$$\underset{2n}{\text{Spermatogonia}} \rightarrow \underset{2n}{\text{Primary spermatocytes}} \xrightarrow{\text{Meiosis-I}} \underset{n}{\text{Secondary spermatocytes}} \xrightarrow{\text{Meiosis-II}} \underset{n}{\text{spermatids}} \rightarrow \underset{n}{\text{spermatozoa}}$$

The spermatozoa can be identified from their elongated head and a long tail.

4. Between the germinal cells, prominent pyramid-shaped slender Sertoli cells are present which provide nourishment to the developing sperms.
5. Interstitial tissue contains blood vessels and Leydig cells or Interstitial cells which secrete testosterone.



T.S. of mammalian testis showing seminiferous tubule

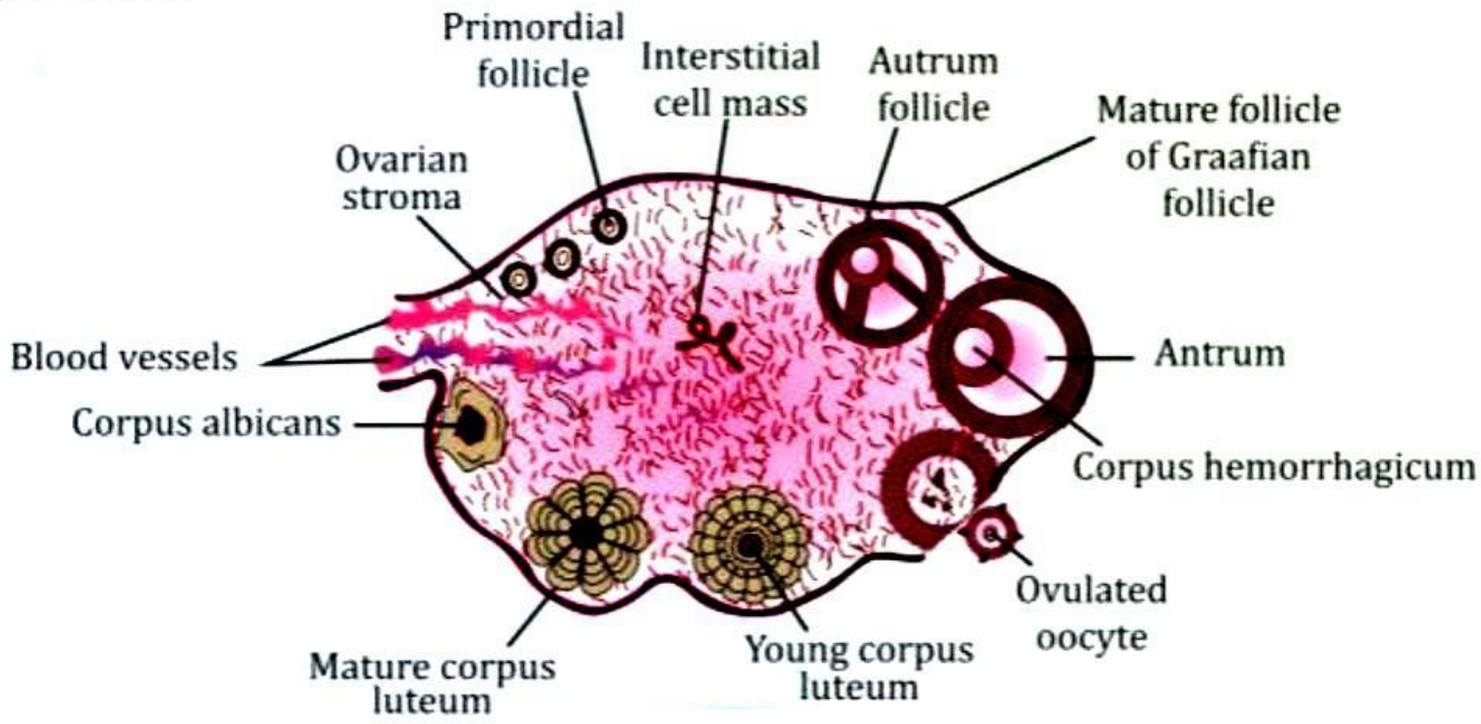


Sectional of a seminiferous tubule (enlarged)

T.S. of mammalian testis

T.S. of Mammalian Ovary Shows:

1. Outermost covering of ovary is germinal epithelium which lines the thick layer of fibrous tissue called tunica albuginea.
2. Stroma consists of connective tissue, blood vessels and nerve fibres.
3. Towards the periphery, stroma or cortex contains many rounded bodies called Ovarian follicles or Graafian follicles at different stages of development.
4. Each Graafian follicle has a large ovum surrounded by many layers of follicle cells.
5. Cortex may also contain a large mass of yellow cells called corpus luteum formed after ovulation and it secretes progesterone.



RESULT

The transverse sections of testis and ovary of mice (mammal) clearly show the developmental stages of sperms and ova by the process of gametogenesis.

PRECAUTIONS

1. The prepared permanent slide should be handled carefully.
2. It should be observed initially under the low and then under the higher magnification of the microscope.
3. The diagram of the structures seen in T.S. of ovary and testis should be drawn and should be labelled properly in order to develop understanding of the detailed structures.

VIVA VOCE

Q1. What is spermatozoa?

Ans. The mammalian male gamete is called spermatozoa.

Q2. What would happen if meiosis fails to occur in gametocyte?

Ans. If meiosis fails to occur in gametocyte, the gamete will have two sets of chromosomes and this result in the chromosomal aberration.

Q3. At which stage of follicular development is ovum released?

Ans. The mature Graafian follicle rises to the surface of ovary, develops stigma and ruptures releasing ovum in the middle of the cycle, i.e., 14 - 16 day. This is called ovulatory phase.

Q4. Spermatogenesis is a continuous process. Justify the statement.

Ans. The seminiferous tubules are lined by germinal cells which keep dividing to produce Primordial Germinal Cells (PGCs) and elongated columnar polygonal cells called Sertoli cells. Primordial germinal cells divide mitotically to produce large number of sperm mother cell and this is a repeating process. It continues to produce huge number of sperms through gametogenesis. throughout the sexually active period of males.

Q5. What would happen if sperms are devoid of their tails?

Ans. The tail of sperm is important for the movement of sperms to reach to ovum. Any default structure of sperm will make it worthless and unable to reach to the ovum.

Q6. What are the consequences of failure of ovulation?

Ans. The process of ovulation makes the ovum available for fertilisation. If ovulation does not occur, there will be no fertilisation and there will be no pregnancy or reproduction.

Q7. What is the function of Sertoli cells?

Ans. Sertoli cells provide nutrition to the developing spermatozoa.

Q8. What is the function of Leydig cells?

Ans. Leydig cells produce male sex hormone named testosterone.

Q9. What is corpus luteum?

Ans. Graafian follicle releases its ovum at maturity and empty Graafian follicle becomes endocrine gland called corpus luteum.