

# Exercise 4

**Aim:** To study the discrete stages of gametogenesis in mammalian testis and ovary

**Principle:** In all male and female organisms gamete formation takes place in their gonads, i.e., testis and ovary respectively. The process of gamete formation, called gametogenesis involves meiotic cell division. The gametogenic development in testis is called spermatogenesis and in ovary it is oogenesis. They exhibit marked differences and can be examined in transverse section (T.S.) of these organs.

**Requirement:** Permanent slides of T.S. of testis and ovary, compound microscope, lens-cleaning paper and cleaning fluid

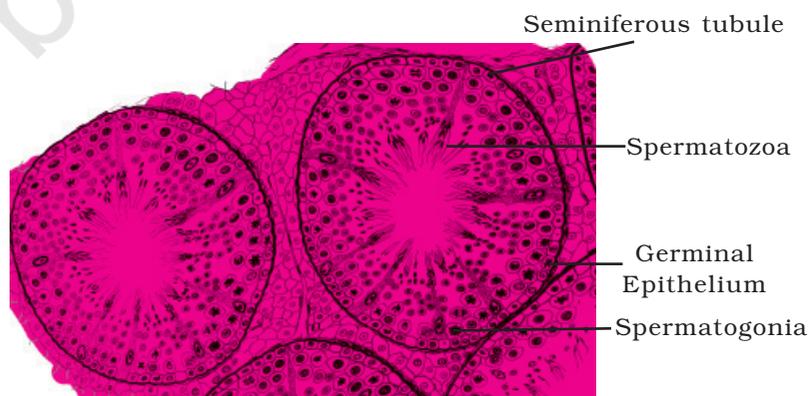
## Procedure

- (i) Clean the slide and microscope's eye and objective lenses with the help of lens cleaning paper using any cleaning fluid.
- (ii) Place the slide on the stage of the microscope and observe first under lower magnification and then in higher magnification. Observe various stages of gamete development.
- (iii) Record your observations in the notebook and draw labelled diagrams.

## Observation

### T.S. of testis

- (i) You will observe a large number of seminiferous tubules under lower magnification. Observe a complete tubule in higher magnification and view various stages of gamete development from periphery towards lumen (Fig. 4.1) and identify the following types of cells namely, Germinal epithelium, Spermatogonial cells, Primary spermatocytes, Secondary spermatocytes, Spermatids and Spermatozoa.



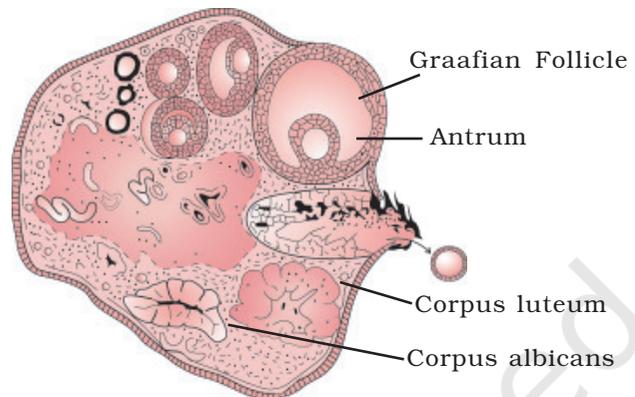
**Fig. 4.1** T.S. of mammalian testis

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- (ii) In T.S. of testis the space between tubules are filled with blood vessels and a specific cell type called Leydig's cell or Interstitial cells.

### T.S. of Ovary

- (i) In the section of ovary, there is a mass of tissue lined with germinal epithelium. Inside that you will observe an ovum, which is a cell surrounded by one to several layers of follicular cells. As the ovum matures, the number of surrounding follicular cell layer increases (Fig. 4.2).
- (ii) In the later stage of follicular development a cavity called **antrum** appears.
- (iii) The cavity gets further enlarged and the follicle grows bigger. This is the stage of **Graafian follicle** ready to release the ovum (ovulation).
- (iv) In the next stage, you may notice a Corpus luteum, and/or Corpus albicans, which differ from each other and also from Graafian follicle in their features.



**Fig. 4.2** Section of mammalian ovary

## Discussion

Spermatogenesis is a continuous process after attainment of puberty, and that is why gamete development and spermatozoa are observed in a single seminiferous tubule. In case of ovary, the follicular development stages are observed.

## Questions

1. What would happen if meiosis fails to occur in gametocyte?
2. At which stage of follicular development, is ovum released?
3. Spermatogenesis is a continuous process. Justify the statement.
4. Draw a labelled diagram of T.S. of testis.
5. Draw a labelled diagram of T.S. of ovary.
6. What would happen if sperms are devoid of their tail?
7. What are the consequences of failure of ovulation?

# Exercise 5

**Aim:** To study and identify various stages of female gametophyte development in the ovary of a flower

**Principle:** In flowering plants, female gametophyte (embryo sac) is a microscopic structure situated deep inside the ovule. An ovule generally has one female gametophyte. Development of female gametophyte begins with megaspore mother cell. Most common type of female gametophyte is the monosporic, 8-nucleate, 7-celled type.

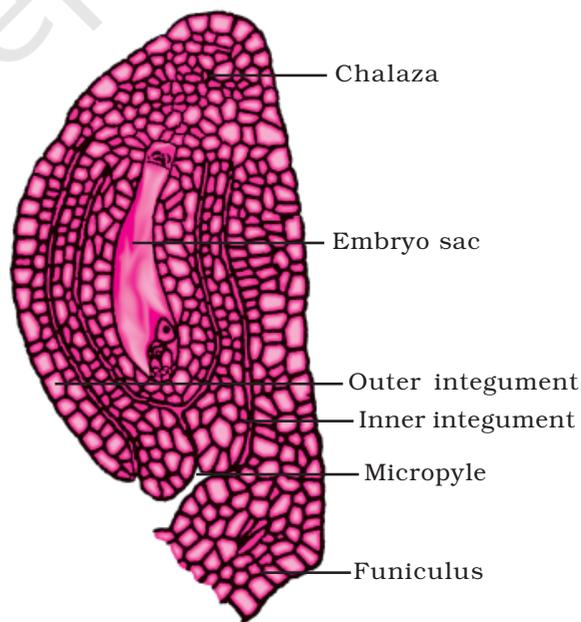
**Requirements:** Permanent slides of V.S. of ovary, photographs/chart or models showing stages of female gametophyte development and microscope

## Procedure

- (i) In a V.S. of ovary we generally find several ovules. Carefully observe each ovule and locate as many stages of female gametophyte development as possible.
- (ii) Draw the diagrams as observed under microscope.

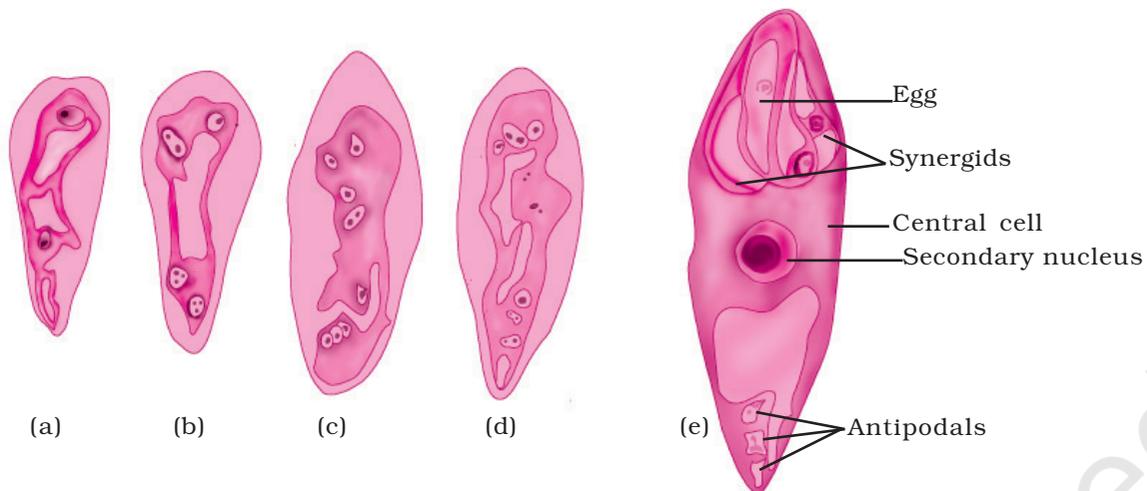
## Observation

- (i) Record the features of ovule like number of integuments, nucellus and micropylar and chalazal poles. Fig 5.1 shows the female gametophyte (embryo sac) as seen in a V.S. of an ovule. Different stages of development of female gametophyte are shown in Fig. 5.2.
- (ii) Observe the placement of embryo sac close to the micropylar pole.



**Fig. 5.1** V.S. of an ovule

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**Fig. 5.2** Stages of gametophyte development: (a) megaspore with 2 nucleus (b) 4-nucleate stage (c) 8-nucleate stage (d) 8-nucleate stage showing 3+2+3 distribution of nuclei (e) mature embryo sac.

- (iii) Note the contents of embryo sac, namely, an egg apparatus (2 synergids and egg) at micropylar end, secondary nucleus in the center and three antipodal cells at the chalazal end (Fig. 5.2).

### Questions

1. Explain the difference between gamete and a gametophyte.
2. Name two differences between synergids and egg.
3. What is the function of polar nuclei?