



**Spermatogenesis:**

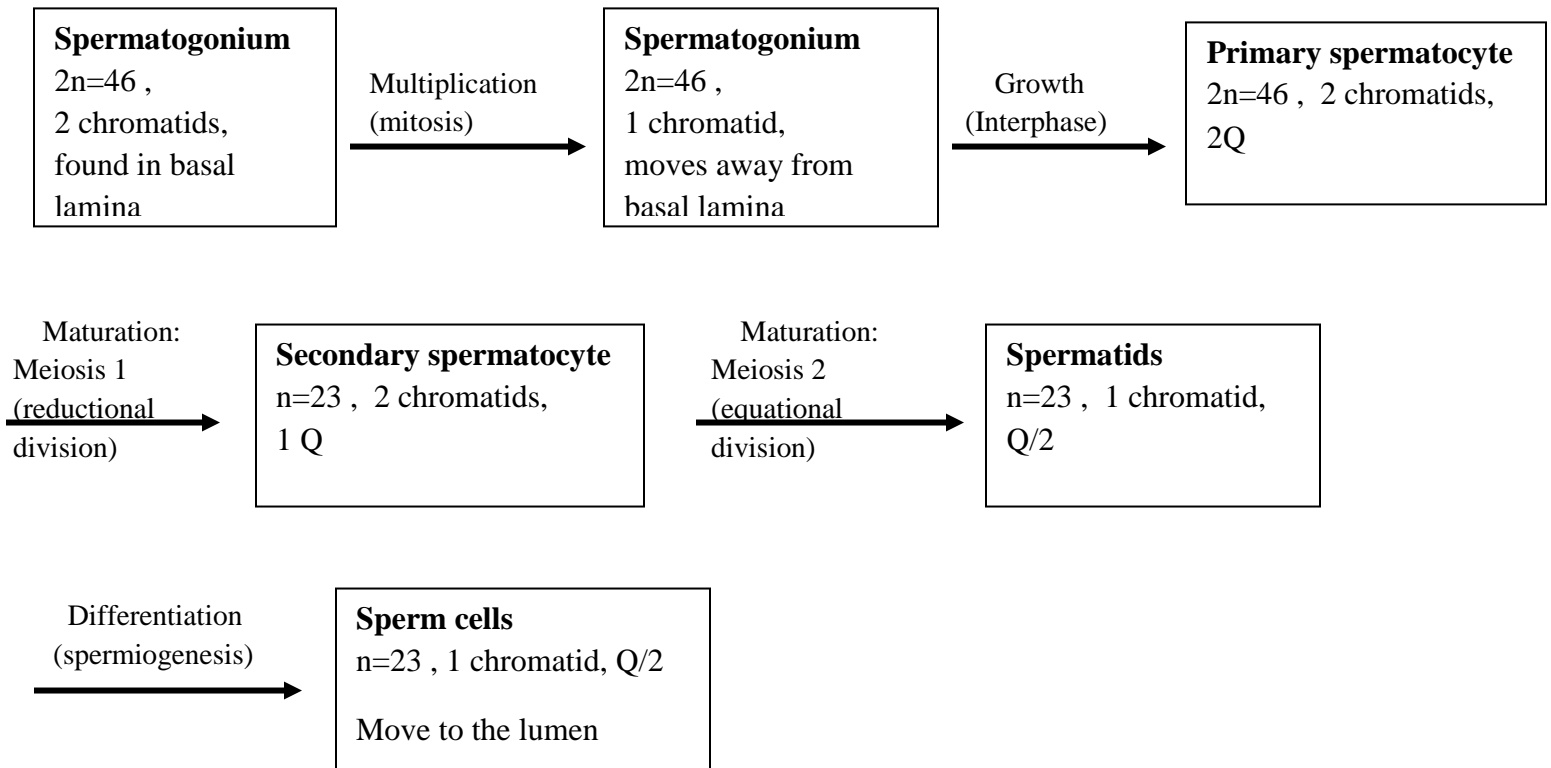
- It is the process by which testes produce haploid sperm cell.
- It occurs in the walls of seminiferous tubules of lobules of the testicle.
- Spermatogenesis starts at puberty and continues till death.
- It takes 74 hours and produces big number of sperms.

**Testicles:**

- The testicle has many lobules. Each lobule has coiled seminiferous tubules where spermatogenesis occurs in its walls. (doc.a)
- Between seminiferous tubules of the same lobule there are leydig cells (interstitial cells). Leydig cells are diploid cells ( $2n=46$ ) and they secrete testosterone. (doc. b)

**Phases of spermatogenesis: (doc.d)**

- Spermatogenesis occurs in a centripetal way from the periphery to the middle since it starts at the basal lamina at the periphery and ends in the lumen (center).
- Phases of spermatogenesis: (doc.d)
  - 1- Multiplication (successive mitosis): Increases the number of cells
  - 2- Growth phase: Duplication of DNA, increase in size of nucleus and cytoplasm
  - 3- Maturation (Meiosis); to give 4 daughter cells called spermatids
  - 4- Differentiation: spermatids become sperms



➤ **Probing activity 1:**

1. Leydig cells are located between seminiferous tubules in the same lobule, they secrete testosterone male sex hormone.

2. Sertoli cells are located at the walls of seminiferous tubules.

They help in the nourishment of dividing cells. They keep the dividing cells of the same mother germ cell in contact with each other and with it. At the end of differentiation, sertoli cells release sperms to the lumen which are then carried to the epididymis.

N.B. Sertoli cells and leydig cells are diploid somatic cells

➤ **Probing activity 2:**

Spermatogonium (after multiplication): 2n=46 (diploid), 1 chromatid

Primary spermatocyte: 2n=46 (diploid), 2 chromatids

Secondary spermatocyte: n=23 (haploid), 2 chromatids

Spermatids: n=23 (haploid), 1 chromatid

Sperm cell (spermatozoa): n= 23 (haploid). 1 chromatid

➤ **Probing activity 3:**

a- spermatogonium

b- primary spermatocyte

c- secondary spermatocyte

d-spermatid

e- sperm cells

➤ **Spermiogenesis (differentiation) (doc.e):**

It is the process by which spermatids become sperm.

- Steps:**
1. The spherical form of the spermatid becomes elongated.
  2. Golgi apparatus produce a small sac that contains digestive enzymes. This sac is called acrosome and it is attached at the top of the nucleus.
  3. Centriole divides into 2 halves ( proximal centriole and distal centriole). Flagellum originates from distal centriole.
  4. Mitochondria accumulate around the flagellum in the middle part (midpiece) to provide it with energy.
  5. Most of the residual cytoplasm is eliminated for the sperm to become lighter and faster.

N.B. proximal centriole is close to the nucleus. Distal centriole is far from the nucleus.

➤ **Structure of sperm (doc.f)**

Head: contains nucleus + acrosome + small amount of cytoplasm

Mid piece: microtubules bundles + mitochondria

Flagellum: protein sheath

N.B. Sperms need basic medium to survive. The acidity of the vagina deactivates them.

**Role of acrosome:**

Hypothesis: During fertilization, acrosome secretes digestive enzymes that perforate the layers surrounding oocyte.

**Role of mitochondria:**

Hypothesis: Mitochondria produce energy needed for the motility of sperms.

**Sterility:**

- It is the inability to reproduce.
- Causes of sterility that are related to spermatogenesis:
  1. Abnormality during meiosis which leads to the production of low number of sperms (low sperm count)
  2. Abnormality during differentiation where the shape of the sperm is abnormal