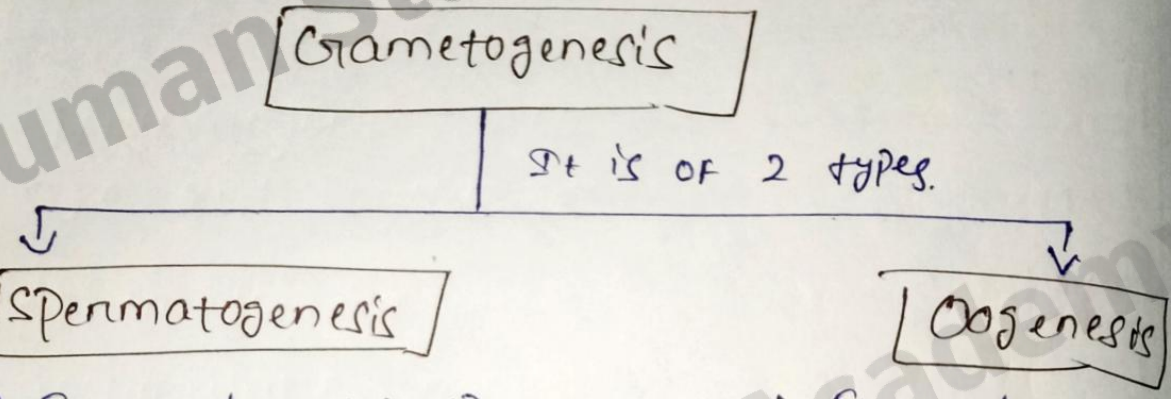
Gametogenesis :-

→ Gametogenesis is the formation of gametes for sexual reproduction.

→ It is carried out in gonads or primary sex organs.



→ Formation of sperm.
→ Occurs in testes.

→ Formation of ovum.
→ Occurs in ovary.

Spermatogenesis :-

→ The process of formation of male gamete i.e. sperm (spermatozoa) is called spermatogenesis.

→ It occurs in seminiferous tubules of testis.

→ It occurs in two successive steps such as

(A) Formation of spermatids

(B) Formation of spermatozoa / spermiogenesis

(A) Formation of spermatids :-

→ This process includes the following phases.

(i) Multiplication phase

(ii) Growth phase

(iii) Maturation phase

(i) Multiplication phase :-

→ The primordial germ cells present in germinal epithelium of seminiferous tubule.

→ At the onset of puberty, the undifferentiated primordial germ cells undergo repeated mitotic cell divisions that produce large number of sperm mother cells or spermatogonia.

→ A set of spermatogonia serve as stem cells which divide and redivide further to form spermatogonia.

→ The other set do not divide mitotically but develop and divide meiotically to produce sperms.

→ Each spermatogonia is diploid and contains 46 chromosomes (2n).

(ii) **Growth Phase :-**

→ Spermatogonia grow and increase in size and forms primary spermatocytes.

→ Spermatogonia grow in size by obtaining/accumulating nutritive materials from surrounding supporting cells (sertoli cells).

(iii) **Maturation Phase :-**

→ This phase involves meiosis of primary spermatocyte.

→ The 1st maturation division (Meiosis-I) or 1st meiotic division is reductional reducing the chromosome number to half in each daughter cell.

→ In man, the primary spermatocyte containing 46 chromosome is reduced to 23 in each daughter cell.

→ After 1st division the two daughter cells are called secondary spermatocyte having 23 chromosome in each.

→ Each secondary spermatocyte undergoes the second maturation division to form 4 haploid spermatids.

→ Each containing 23 chromosomes in man.

(B) **Formation of Spermatozoa:-**

→ The spermatids transform into spermatozoa (Sperm) by the process called Spermiogenesis.

→ The different changes taking place in spermatids are:

(i) The large spherical nucleus of spermatid becomes elongated and but reduced in size.

(ii) The golgi bodies condense into a cap like structure called acrosome in front of the nucleus.

etc. etc.

→ The metamorphosis of spermatids into motile sperm occurs because a sperm possesses many structures which are not typical to a spermatid.

→ After spermiogenesis, sperm heads are embedded in the sertoli cell. and finally released from the seminiferous tubule by the process of spermiation.

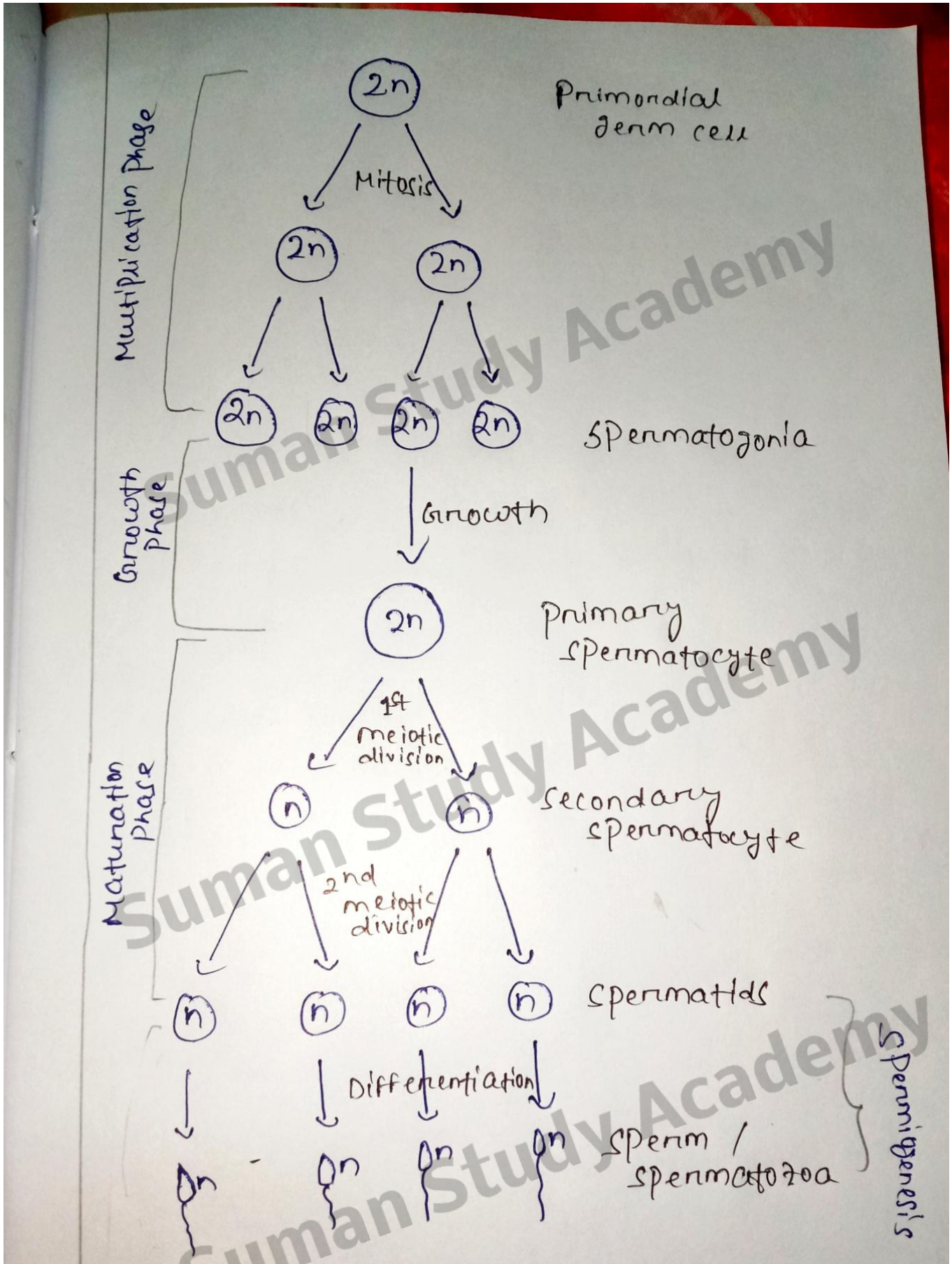


Fig - Spermatogenesis

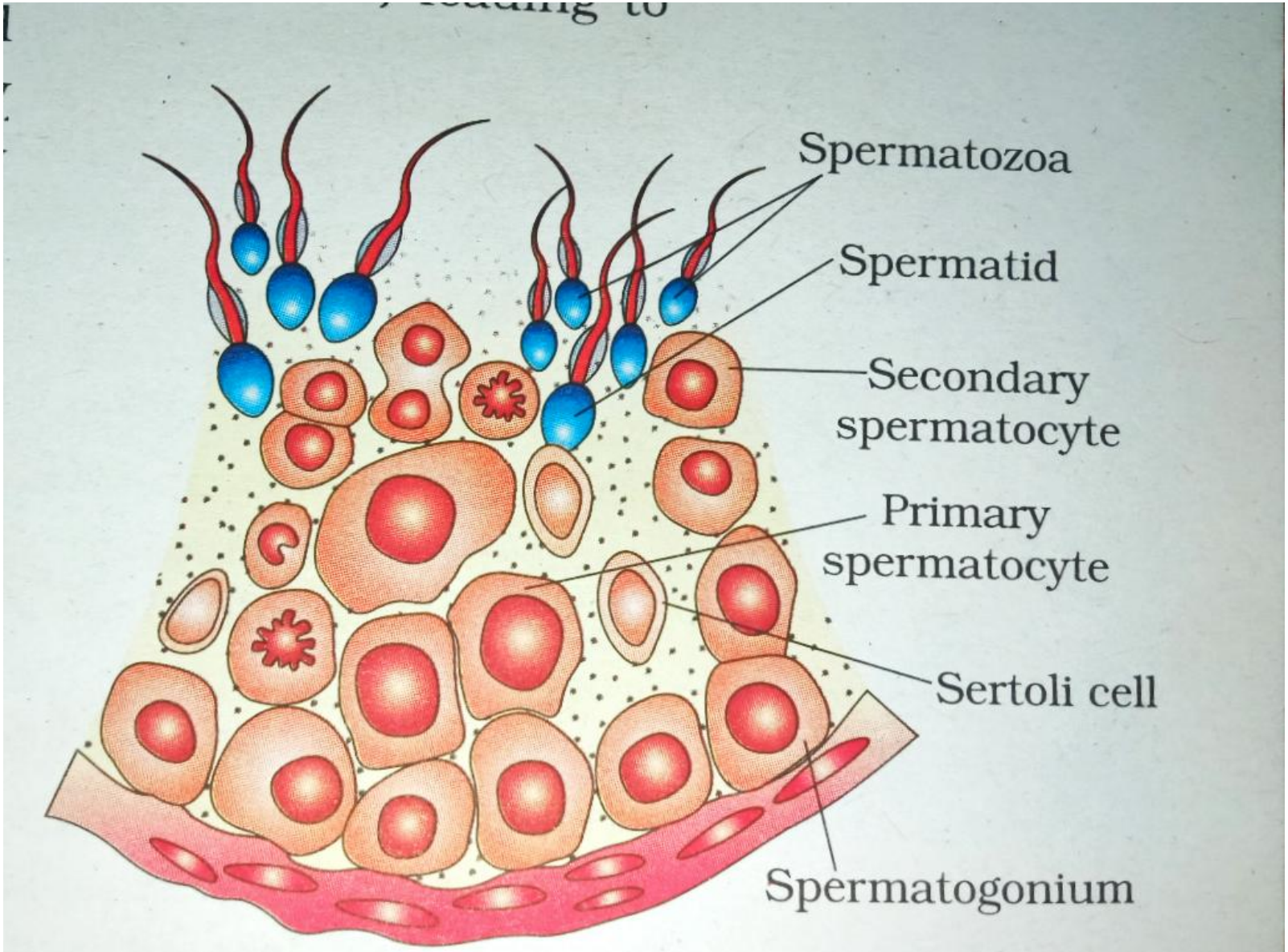


Figure 3.5 Diagrammatic sectional view of a seminiferous tubule (enlarged)

Hormonal control of spermatogenesis :-

→ Spermatogenesis is initiated at the age of Puberty by the gonadotropin releasing hormone (GnRH) secreted by the hypothalamus.

→ The increased levels of GnRH stimulate the anterior pituitary which then secretes the FSH (Follicle Stimulating hormone) and LH (Luteinising hormone).

→ FSH stimulates sertoli cells to secrete some factors which help in spermiogenesis.

→ LH acts on the Leydig cells of testis, stimulating the secretion of androgens which in turns stimulates the processes of spermatogenesis.

Structure of sperm:-

→ A mature sperm consists of 4 parts.

(i) Head
(ii) Neck
(iii) Middle piece and
(iv) Tail

→ A plasma membrane encloses the entire sperm.

(i) **Head:-**

→ The sperm head contains haploid nucleus.

→ The tip of it is covered by a cap like structure known as acrosome.

→ The acrosome contains hydrolytic enzymes that help dissolving membranes of the ovum for fertilisation.

(ii) **Neck:-**

→ It is short.

→ It contains two centriole.

(iii) **Middle piece:-**

→ It is cylindrical.

→ It is known as the power house of the sperm.

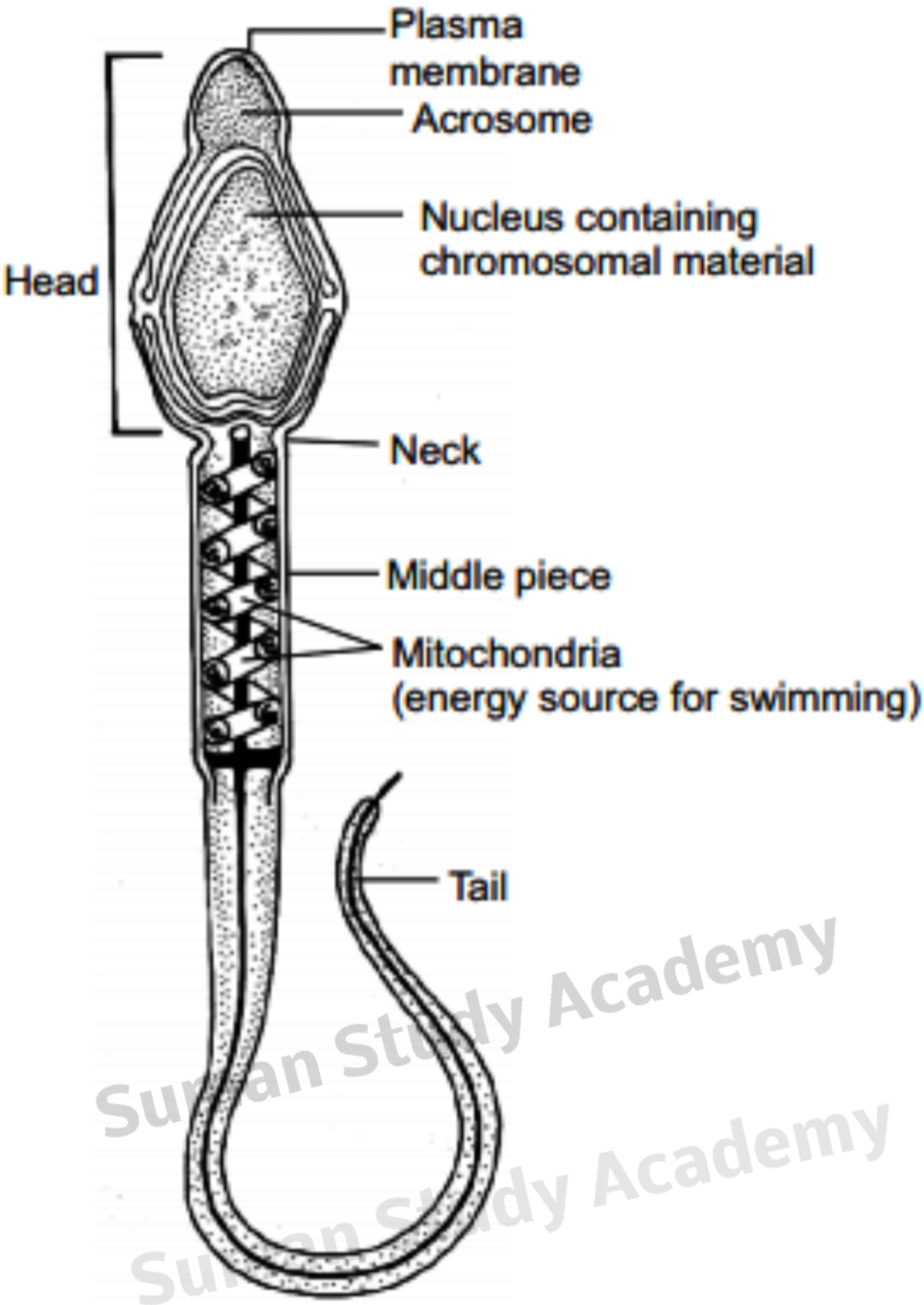
→ It possesses many mitochondria to produce energy for the movement of the tail that facilitates sperm motility essential for fertilization.

(iv) **Tail:-**

→ It is long, vibratile.

→ It helps the sperm to swim in a fluid medium.

→ The alkaline fluid (pH 7.2) ejaculated by man is a mixture of seminal plasma and sperms called <u>semen</u>.



Structure of a sperm

Significance of spermatogenesis :-

→ One spermatogonia produces 4 sperms.

→ Sperms are haploid containing (n) number of chromosomes, so that after fertilization diploid number (2n) is restored in zygote.

→ Spermatogenesis plays a vital role in organic evolution.

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