

B.SC - Semester 2

(Core course – Theory)

Course Code – 1ZOOTC0201

Course Title - Comparative anatomy and developmental biology of vertebrates

UNIT: 5

Topic : Structure of Mature Spermatozoon

Structure of mature spermatozoan: The spermatozoa vary greatly in size and in the shape of the head and the middle piece in different animals. The spermatozoa have a similar structure in most of the animals. In general, spermatozoa consist of four parts:

- i. Head**
- ii. Neck**
- iii. Middle piece**
- iv. Tail**

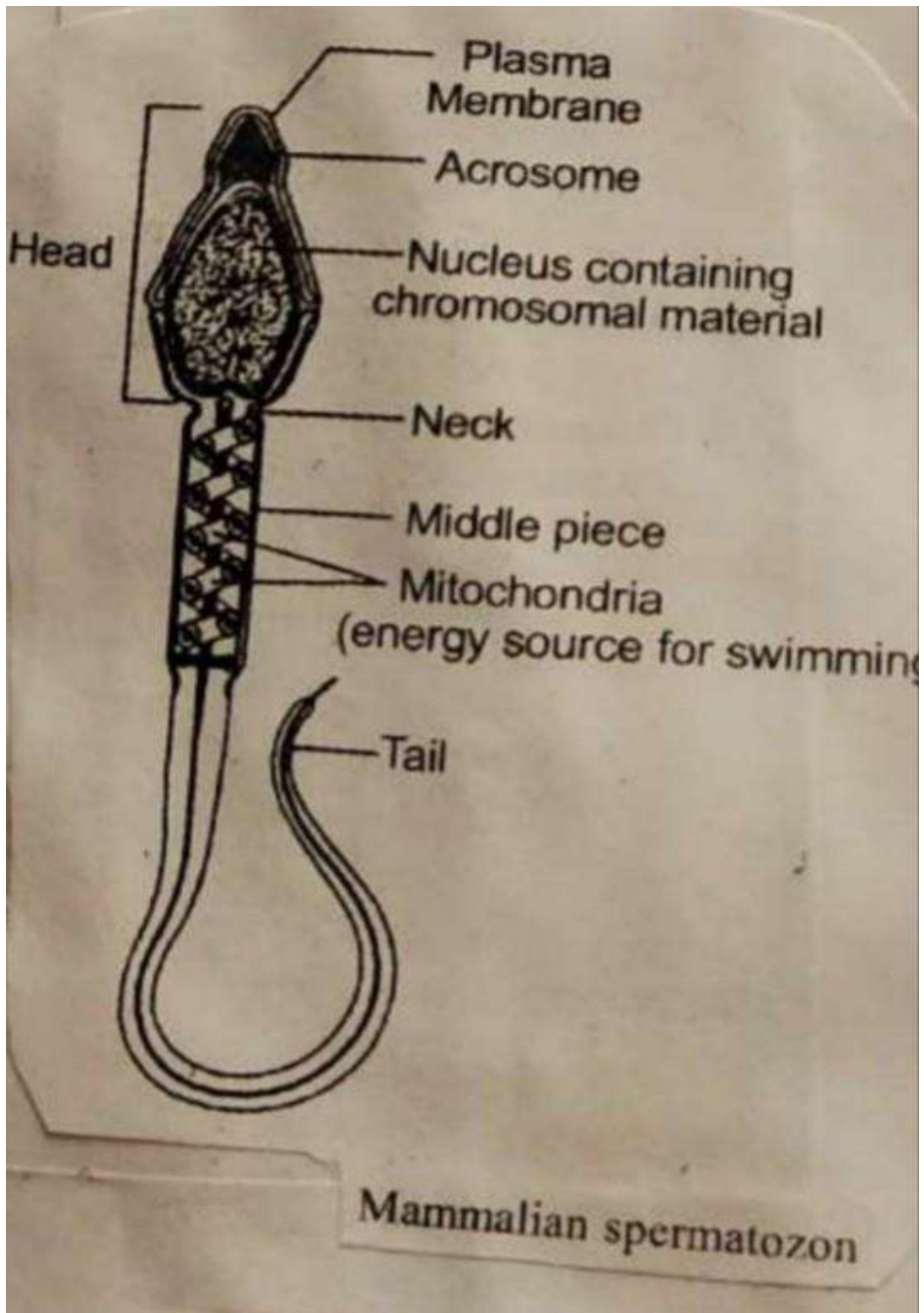


Fig. Mammalian spermatozoon

Each part has a specific function

Structure of head of sperm:

The sperm head consist of mainly nucleus and acrosome. It's shape, size and structure vary greatly in different groups of vertebrate. The nucleus of head consist of almost entirely of DNA plus nuclear proteins and thus responsible for the transmission of hereditary character from the male.

The nucleus of the sperm occupies major part of the head and it's shape, Ultimately determine the shape of the head of sperm. At the anterior end of the sperm nucleus occur a cap like structure like acrosome. The shape and size of the acrosome vary among different species. The acrosome is bounded by an acrosomal membrane and it contain acrosomal polyaccharides like galactose, fructose and hexosamine. A large number of enzymes especially hydrolases are also present in the acrosome. It contains also two important enzymes such as hyaluronidase and

zonolysin or acrosin which functions during entry of the sperm into the ovum.

Neck: The neck is very short slightly constricted segment made up of projections located between the base of the head and the first gyre of the mitochondria helix of middle piece. It consists of two centrioles i.e. proximal and distal centrioles which are lying one behind the other. The proximal centriole plays a role in the first cleavage of the zygote. A distal centriole gives rise to the axial filament of the sperm.

Middle piece: This piece is cylindrical. It consists of many mitochondria tightly coiled the axial filament. The mitochondria provide energy for the movement of sperm in the female genital track. Middle piece, is also called as power house of spermatozoon. The amount of energy available is limited. If the sperm fails to contact on ovum within specific period, it exhausts its energy and dies. The middle piece ends in a structure called annulus. Behind annulus, axosome is covered by fibrous sheath

Tail (Flagellum): It is the longest part of sperm. It is cylindrical and tapering part. It is formed of two parts, central, contractile and microtubular part called axoneme or axial filament and outer fibrous protoplasmic sheath. Axoneme is formed of 11 proteinaceous microtubules in 9+2 manner. In many sperms like of frog the fibrous sheath of tail becomes thinner and thinner and it ends a little before the end of axoneme. The uncovered part of tail is called end piece. Sometimes a ring centriole may be present at the junction of middle piece and flagellum tail shows lashing movement which provides forward push to the sperm.