(B) MITOCHONDRIA

Mitochondria was discovered by Kolliker in the year 1880 A.D. He found it in the striated (Voluntary) muscles of flight in insect. But he did not name it. In the year 1882 A.D. Flemming called it "fila". Later on Altman named it "bioplast" in the year 1890 A.D. Later on the word mitochondria was coined for it by C. Benda in the year 1897 A.D.

Mitochondria are present in almost all eukaryotic cells except mature mammalian red blood cells. They are absent in prokaryotes.

They greatly vary in shape and size. They may be granular, fibrillar, spherical, oval, discoid or sausage shaped. In size they vary from 0.1 μm^3 to 20-40 μm^3. They can be seen through light microscope.

Their number in cell corresponds to the activity of the cell, in Microcytes it ranges minimum (1) one per cell to (500,000) five lac per cell in flight muscles of insect.

In the cell they are present near the area where quick availability of energy is needed e.g. absorptive surface of intestinal cells, at the base of cilia and flagellum.

Electron microscopic study of mitochondria reveals that.

Mitochondria consists of two cell membranes. Outer membrane is regular and stretched. This membrane has less protein and more permeable and smooth. The inner membrane have more protein. It is semipermeable.

The inner membrane is variously inwardly folded into finger-like structures known as cristae. Cristae may be branched or unbranched. The number of cristae depends upon the size and activity of mitochondria. Cristae incloses an intra-cristal space in continuation with outer chamber.

Cristae bears knob like structures known as oxisomes or elementary particles or respiratory assemblies or inner membrane sphere. They also possess enzymes of electron transport system.

An oxisome is itself consists of three parts

(i) Base Piece → It is also known as F_0 F_0 sub-unit. It is 115 X 45 A° in size. It is embeded in the inner mitochondrial membrane.

(ii) Stalk → It is also known as F_5-F_6 sub-unit. It is a ~~rectangular~~ 33 A° in height. It bears the head. It is in mitochondrial matrix.

(iii) Head → It is known as F_1- sub unit. It is spherical ∴ It is 100 A° in diameter.

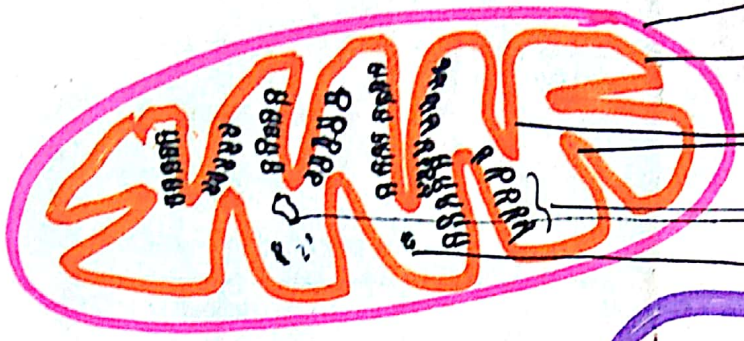
Number of Oxisomes varies from (10,000) ten thousand to (100,000) one lac. per mitochondria. Head contains ATPase or ATP synthetase enzyme. Hence Oxisomes are also known as ATP- particles.

In the ~~matrix of~~ inner chamber of mitochondria mitochondrial matrix is there. It contains m-DNA, ~~m-r~~ RNA. ~~m~~ m-ribosomes (55-S ~~in size~~ type), Mn^{++} or Mg^{++}, riboflavin etc. It contains enzymes of Krebs' Cycle, protein synthesis and fat synthesis. ~~About 70% of total cellular en~~ Mitochondria contains about 70% of total cellular enzymes.

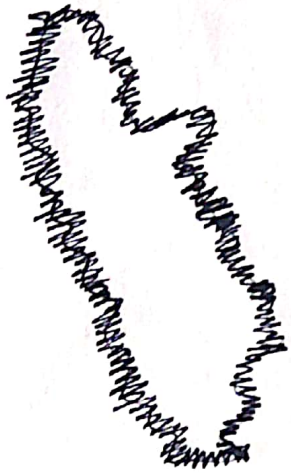
Perimitochondrial space, the space between the two membranes of mitochondria is about 20 - 60 A° in width. It is filled with water enzymes and minerals.

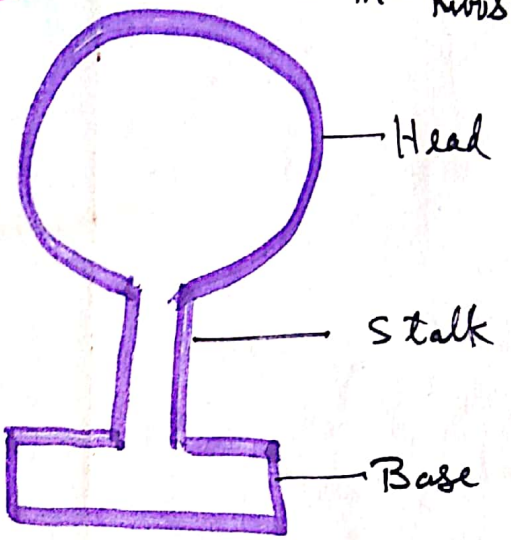
Mitochondria are semiautonomous in nature. They are self dupticating ones like chloroplasts. They are generally formed from pre-existing mitochondria.

They are site of Krebs Cycle, ~~and~~ electron transport system, haeme synthesis ~~in~~ for myoglobin and haemoglobin, biosynthesis of certain aminoacids, thermiogenesis. They also regulate the calcium ion concentration inside the cell.



L.S. of Mitochondria (Dia).





F1 Particle (Dia.)

Mitochondrial DNA