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B-sc-I, (Zool 'Sub') MITOCHONDRIA

Paper - I (Gr B)

Q. - Give an account of structure and functions of mitochondria.

Ans - Mitochondria is an important organelle (living substance) of cell. It provides energy to different part of cell hence it is also called "power house of the cell."

History:

- (1) KOLLICKER (1880): - Discovery of mitochondria in insects muscles and called it Sarcosome.
- (2) FLEMMING (1882): - Mitochondria is found in the form of filamentous structure and called it Fila.
- (3) ALTMAN (1890): - Mitochondria is found in the form of globular structure and called it bioplast.
- (4) C. BENDA (1897): - Give the term mitochondria which is made by two words: (mito = Thread and chondrion = Granule)
- (5) MICHAELIS (1898): - Mitochondria take part in cellular respiration.
- (6) BENSLEY AND HOERR (1934): - Isolated mitochondria from liver cells. Mitochondria is also known as chondriosome, chondriomites, plastochondria, filavermicules etc.

Definition: - Small granular or filamentous cytoplasmic organelles concerned with the cellular respiration are known as mitochondria. These are the main source of energy. About 95% cellular ATP is produced within these, hence they are known as the power houses of the cells.

Distribution: Generally these are uniformly distributed in the cytoplasm.

In some cases it may be localised to an area such as

- (i) between the myofibrils in skeletal muscles.

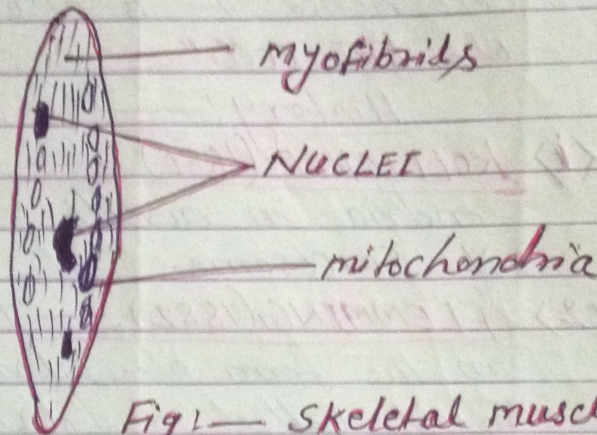


Fig: — skeletal muscles

- (ii) In the basal region of the cell in the proximal convoluted tubules of kidney.

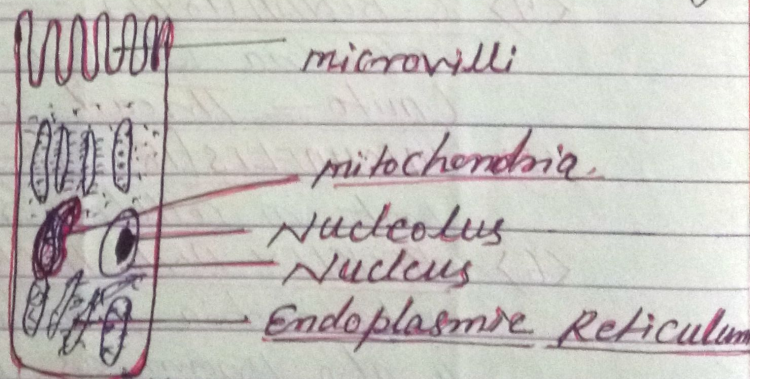


Fig: — kidney cell.

- (iii) In cleft between the myofibrils of cardiac muscle.
- (iv) Radially arranged in leucocytes.
- (v) In a portion of the inner segment of rod and cone cells of the retina.
- (vi) Remain concentrated around the spindle during cell division.

(vii) Mitochondria along with ER constitute a spiral sheath at the base of the tail around the axial filament in sperm.

SIZE: — Mitochondria vary considerably in size. It ranges from 0.2 to 2 micron in diameter and from 0.3 to 40 micron in length. The shortest ones are spherical whereas the bigger ones are filamentous. The pancreatic cells of mammals contain mitochondria of 10 micron length.

Oocytes of Rana pipiens contain mitochondria of 20-40 micron length.

SHAPE: — The shape of mitochondria depends upon physiological conditions of the cells. It may be spherical, granular, filamentous, club, racket, vesicular or ring shaped. Sperm and eggs contain spherical mitochondria.

NUMBER: — (i) The number of mitochondria varies in different cell types, however it is rather constant for a particular cell type.

(ii) Mitochondria are absent in mature erythrocytes and bacteria where plasma membrane has respiratory enzymes.

(iii) The number of mitochondria is more in cells with high metabolic activity whereas it is less in cells with low metabolic activity.

(iv) On average the number of mitochondria per cell is about 300-800.

(v) Liver cells of rat contain 500 to 1600 mitochondria.