

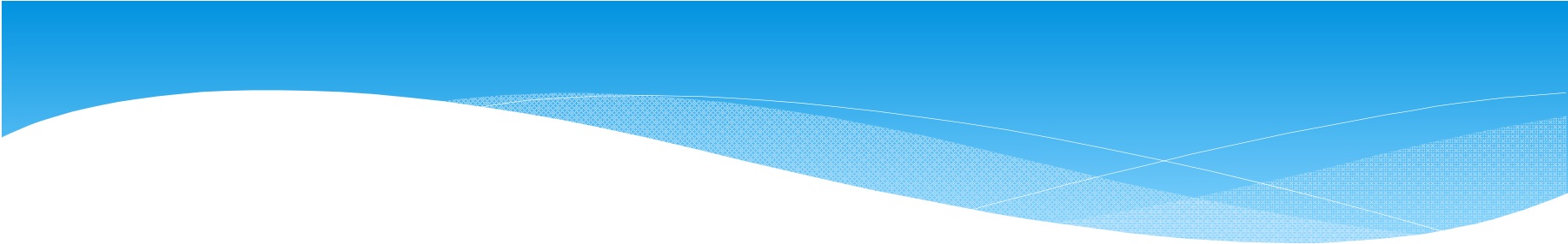
Topic: Cell Organelles
B.Sc. Botany Hons. III
Paper: V Group: A

Dr. Sanjeev Kumar Vidyarthi
Department of Botany

Dr. L.K.V.D. College, Tajpur, Samastipur
L.N. Mithila University, Darbhanga

Mitochondria

- Mitochondria are also known as chondriosomes, are the power generating organelles of a cell, hence they are commonly known as the powerhouse of the cell.
- The mitochondria convert stored nutrients by the help of oxygen to produce energy in for of (ATP)Adenosine triphosphate, hence they are the site for non-photosynthetic energy transduction.
- There are hundreds of mitochondria within a single plant cell.
- Mitochondria are found in high numbers within the phloem pigment of the plant cell, and the neighboring cells have high metabolism rates.
- This is to supply energies that support various needing mechanisms, like the transportation of food through the sieve tubes.

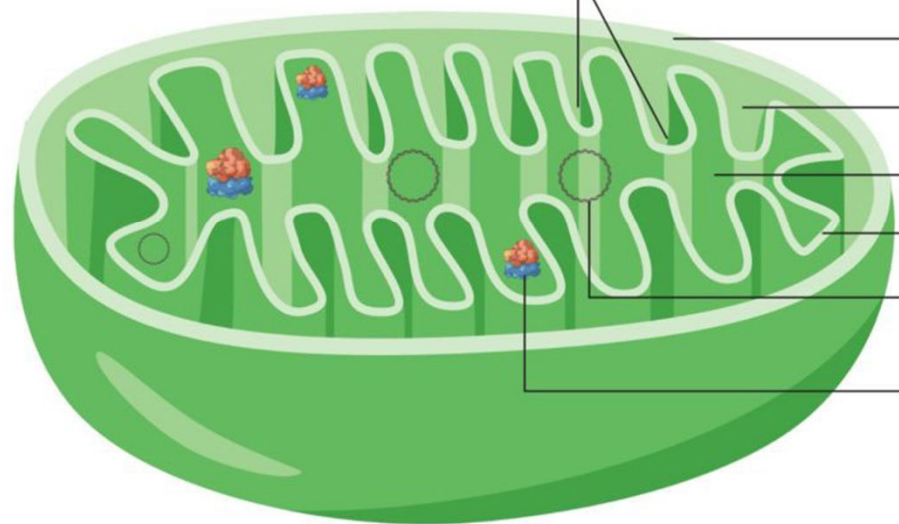
- 
- As they perform their mechanisms, mitochondria continuously move and change their shapes, depending on its interactions with light trapped for photosynthesis, level of cytosolic sugars and the endoplasmic reticulum mediated interactions.
 - The animal and plant mitochondria are very similar except for a few notable differences e.g. mitochondria in plants have reduced nicotinamide adenine dinucleotide (NADH) dehydrogenase used for oxidation of exogenous NADH which animal cell lack.
 - Mitochondria from many plant sources are relatively insensitive to cyanide inhibition, a feature not found in animal mitochondria. On the other hand, the β -oxidation pathway of fatty acids is located in animal mitochondria,

- whereas in plants, the enzymes of fatty acid oxidation occur in the glyoxysomes.

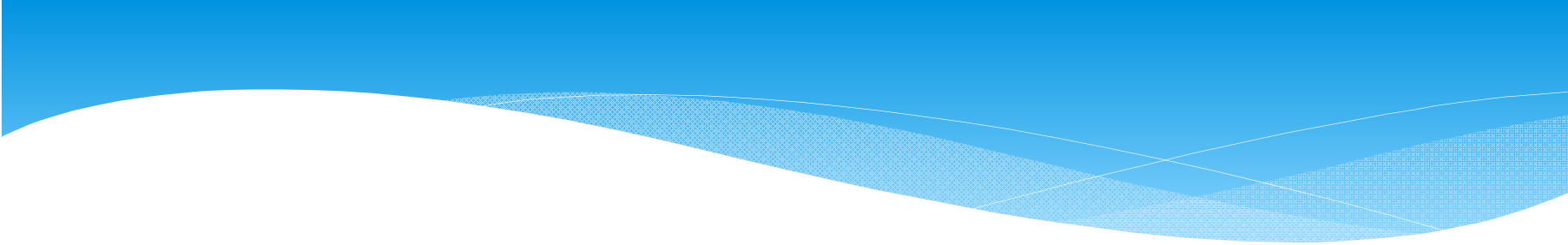
Structure of Plant Mitochondria

- Plant cell mitochondria have high pleomorphism.
- Mitochondria in green plants are discrete, spherical-oval shaped organelles of diameter ranging from 0.2 to 1.5 μm
- The mitochondria have a double-layered system i. e a smooth outer membrane and an inner complex membrane that encloses the organelle matrix.
- The two layers are lipid bilayers complexed with a hydrophobic fatty acid chain.

Mitochondria



- Cristae
- Outer Membrane
- Inter Membrane Space
- Matrix
- Inner Membrane
- DNA
- Ribosome

- 
- These lipids are a class of phospholipids that are highly dynamic with a strong attraction to the fatty acid regions.
 - They have a mitochondrial gel-matrix in the central mass.
 - The mitochondria also possess all the enzymes for the Tricarboxylic cycle (TCA) including citrate synthetase, Pyruvate oxidase, Isocitrate Dehydrogenase, Malate Dehydrogenase, Malic Enzyme.

Functions of mitochondria in plants

- The mitochondria are the powerhouse of the cell, hence their major function is generating energy for use by the cell.
- To have a high rate of metabolism because they supply energy for the unknown mechanism by which foods, mainly sucrose, are transported in



the sieve tubes.

- Within the mitochondria, the potential energy in food that is manufactured by photosynthesis is what is used for the metabolisms of the cells. For example, energy used for the formation of new cell content, enzyme production and moving of sugar molecules are produced by the mitochondria.
- This is the cite for the Tricarboxylic cycle (TCA), also known as the Krebs cycle. The TCA cycle uses the cell's nutrients, converting them into by-products that the mitochondria use for producing energy. These processes take place in the inner membrane because the membrane bends into folds called the **cristae**, where the protein components used for the main energy production system cells, known as the Electron Transport Chain (ETC).
- ETC is the main source of ATP production in the body.