

Mitochondria

- Mito – thread, Chondrion – granule.
- Cytoplasmic organelle of aerobic cells.
- Lipoprotein framework with many enzymes and coenzymes.
- “Power Houses” of the cell
- Semi-autonomous
- Contain Specific DNA for cytoplasmic inheritance
- Kolliker (1857) observed. Benda (1897) assigned the name Mitochondria.

Morphology

- **Number**
 - Depends on the type
 - Varies cell to cell & Species to Species (Amoeba- 50,000, Liver cell of rat- 500 to 1600)
- **Shape**
 - Filamentous/Granular
 - Depending on Physiological condition, Vesicular, Ring & Oval.
- **Size**
 - 0.2-2 μ m, Mamals: 10 μ m long.

Chemical Composition

- Varies cell to cell & Species to Species
 - 65-70% Proteins,
 - 25-30% Lipids (90% Phospholipids:
Lecithin/Cephalin, 5% Cholesterol & 5% free fatty acids,
 - 0.5% RNA/DNA

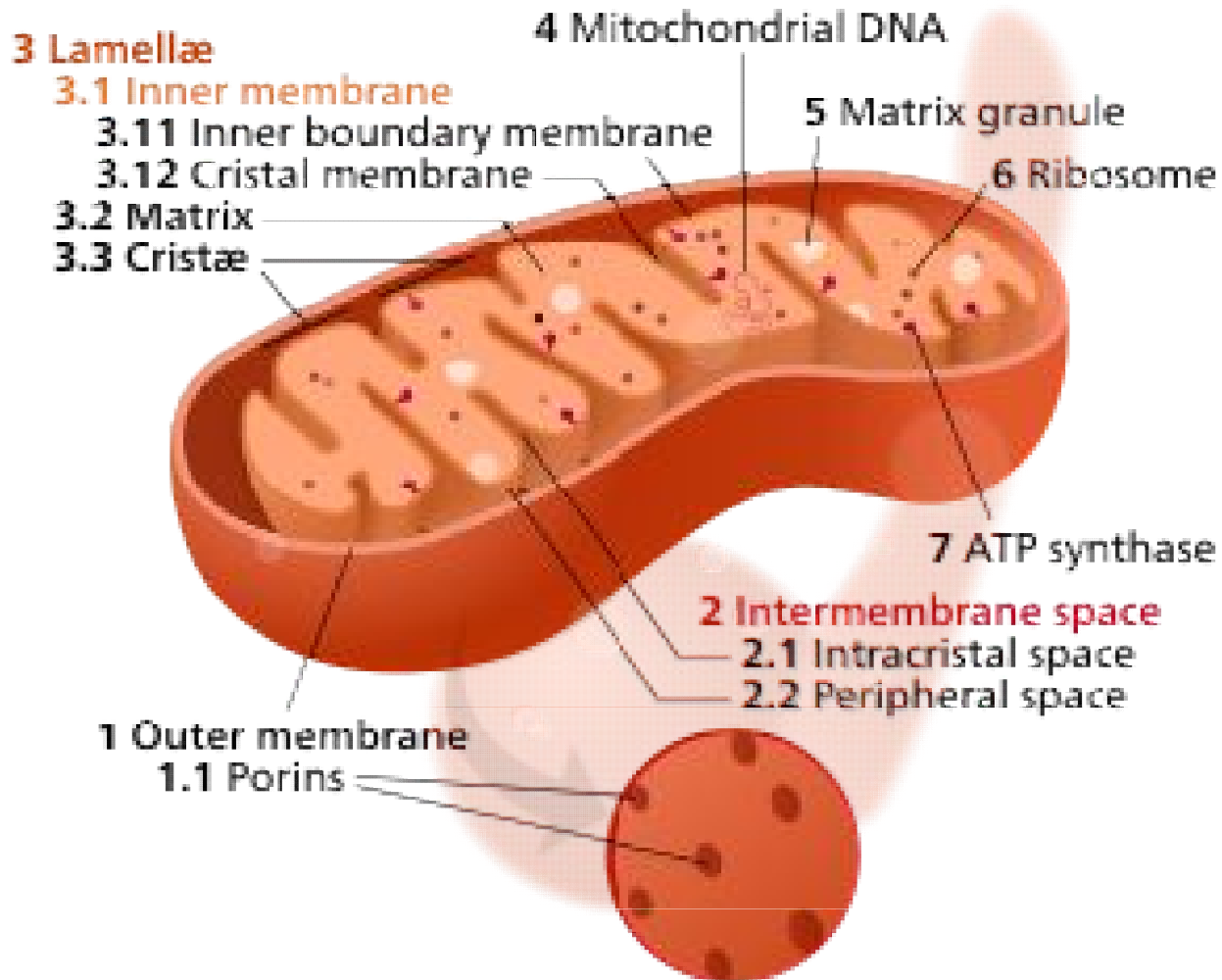
Structure & Components

- Double Membrane Organelle
- 60-70A^o thickness (Inner/Outer membrane)
- Inter membrane space is filled with matrix
- Matrix (Lipids, Proteins, Circular DNA molecule & 70S Ribosome)

Mitochondria

- 1. The outer mitochondrial membrane,**
- 2. The inter membrane space,**
- 3. The inner mitochondrial membrane,**
- 4. The cristae space**
- 5. The matrix**

Mitochondria



Enzyme System of Mitochondria

- The enzyme of outer mitochondrial membrane (monoamine oxidase, NADH-cytochrome-C-reductase)
- The enzyme of inner mitochondrial membrane (NAD: Nicotinamide Adinine Dinucleotide, FAD: Flavin Adinine Dinucleotide, Succinic dehydrogenase, ATP synthetase)
- The enzyme of Mitochondrial Matrix (Malate dehydrogenase, isocitrate dehydrogenase, fumarase, aconitase)

Functions

- Oxidation, Dehydrogenation, Oxidative Phosphorylation and Cellular Respiration.
 1. ATP (Adenosine Triphosphate) Synthesis
 2. Oxidation of Carbohydrates
 - Glycolysis (Glucose-Pyruvate)
 - Oxidative decarboxilation (Pyruvate-Acetyl coenzyme)
 - Kreb/TCA/Citric acid cycle (Acetyl coA-NADH/FADH)
 - Oxidative Phosphorylation (NADH/FADH-ATP)
 3. Oxidation of Fat
 4. Oxidation of Proteins (Transamination)
 5. Heat Production
 6. Biosynthetic/Anabolic property
 7. Transport Property