The mitochondrion is a double membrane organelle found in eukaryotic cells, responsible for ATP production. Its size range between 1µm – a few µm, may be individual or branched, have a tubular network and may change shape.

**The structure and function of the Mitochondrion**

**Mitochondrial Matrix**
- Contains proteins and ions to assist organelle functions.
- Large volume.

**Inner membrane space**
- Folded into cristae to increase the surface area to maximize the rate at which ATP is produced.
- Contains stalked proteins called particles called ATP synthetase.
- H⁺ flow down to produce energy to convert ADP + Pi → ATP.

**Circular DNA**
- Contributes to the Endosymbiotic theory where evolution states Mitochondria were separate prokaryotes engulfed by bacteriophages.

**Outer Membrane**
- Consists a simple phospholipid bilayer
- Semi-permeable membrane to control the movement of substances in and out of the organelle.

**Ribosomes (smaller 70s)**
- Production of proteins.

**Evolution of the Mitochondrion**

**Endosymbiotic theory**
What this theory speculates is that this organelle use to be a separate prokaryotic organisms that was taken inside the cell as endosymbiont (which are any organisms which live inside the body or cell of another organism). It is believed that mitochondria evolved from proteobacteria (examples of pathogens are salmonella and vibrio).

Evidence for this relationship; that mitochondria are similar to bacteria are as follows:
- Mitochondria have their own circular genome and ribosomes (70s) to synthesise their own proteins
- Mitochondria reproduce by binary fission
- Mitochondria and bacteria are similar in size.

Modified image of the Endosymbiotic - theory http://learn.genetics.utah.edu/content/begin/cells/organelles/