Ch 6.5

*Eukaryotic Cells* use **Mitochondria** and **Chloroplasts** to convert energy into something the cell can use.

*Mitochondria* are the sites of **cellular respiration** and metabolic metabolism that uses oxygen to drive the generation of **ATP** by extracting it from *sugars*, *fats*, and other fuels.

* Note: Glucose/Chemical energy + O2 = CO2 + Water + ATP/Chemical Energy

*Chloroplasts* found in plants are the sites of **photosynthesis**. TLDR: Organic solar panels that turn sun to energy which helps make sugar and CO2.

* Note: Light + Water + CO2 = Glucose/Chemical energy.

Endosymbiont Theory is a theory that was created because of the similarities between Mitochondria/Chloroplasts and bacteria. The theory states that a long time ago an oxygen using nonphotosynthetic cell engulfed a bacterium, but it started producing energy for it and by pure chance didn’t kill it and it became so useful that the cell live longer and passed the trait down and boom! We have the powerhouse of the cell.

* The Mitochondria/Chloroplasts have a *Double Membrane/Ribosomes/Circular DNA/Can Reproduce* which confused scientists so much that they investigated it further and that’s why we have E-Theory

*Mitochondria* can be found in nearly every *Eukaryotic Cell*, but the number of *Mitochondria* vary from a couple hundred to several thousand in most cases! **Note: The number found correlates with the metabolic activity.** They can be found in but are not limited to: Plants, Animals, Fungi, and most Unicellular Eukaryotes.

**Cristae** are the infoldings found on the *inner membrane* of a *Mitochondria* which divides the mitochondria into two internal components. The intermembrane space and the **Mitochondrial Matrix** which is enclosed by the inner membrane.

* Note: The Matrix™ is contains many different mitochondrial DNA and ribosomes.
* Note 2: The inner membrane also synthesizes ATP and other proteins used for *cellular respiration.*

Chloroplasts contain the green pigment, along with the enzymes and other molecules that function in the photosynthetic production of sugar. These are found in about every green plant you see.

* The contents of the Chloroplasts are separated by a double membrane like the Mitochondria. The intermembrane is *very thin* but inside of the Chloroplast are flat interconnected sacs (***BEANS***) called **Thylakoids** that when stacked are called **Granum**. The fluid found around the BEANS is called **Stroma** which contains *chloroplast* **DNA** and **ribosomes** along with many **enzymes**.

**Peroxisome** are specialized metabolic compartments bounded by a *single membrane* that contain enzymes that *remove* Hydrogen from various substances and transfer them into O2 which *produces* hydrogen peroxide (H2O2) as a *by-product*. This detoxifies and breaks down things.

* EX: Can use O2 to break down fatty acids and then the smaller molecules are sent to the mitochondria to consume.
* EX: In the liver they detoxify alcohol and other harmful things.
* Note: H2O2 is toxic so the peroxisome has an enzyme that turns it into H2O.