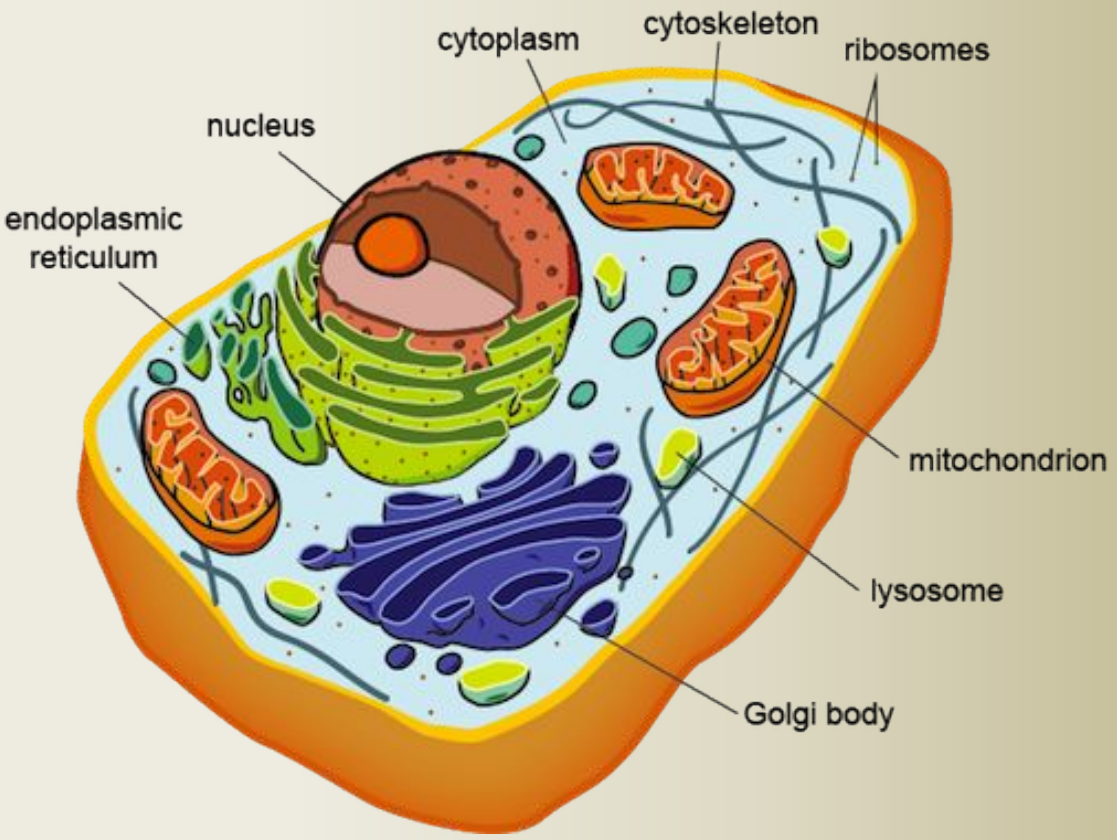
Eukaryotic cell structure

by Julia Tachynska

What Is An Eukaryotic Cell?

A cell is defined as **eukaryotic** if it has a **membrane-bound nucleus**. Any organism composed of eukaryotic cells is also considered a **eukaryotic organism**.

All of the organisms we *can* see with the naked eye are composed of one or more eukaryotic cells, with most having many more than one.



Here are some examples of eukaryotes:

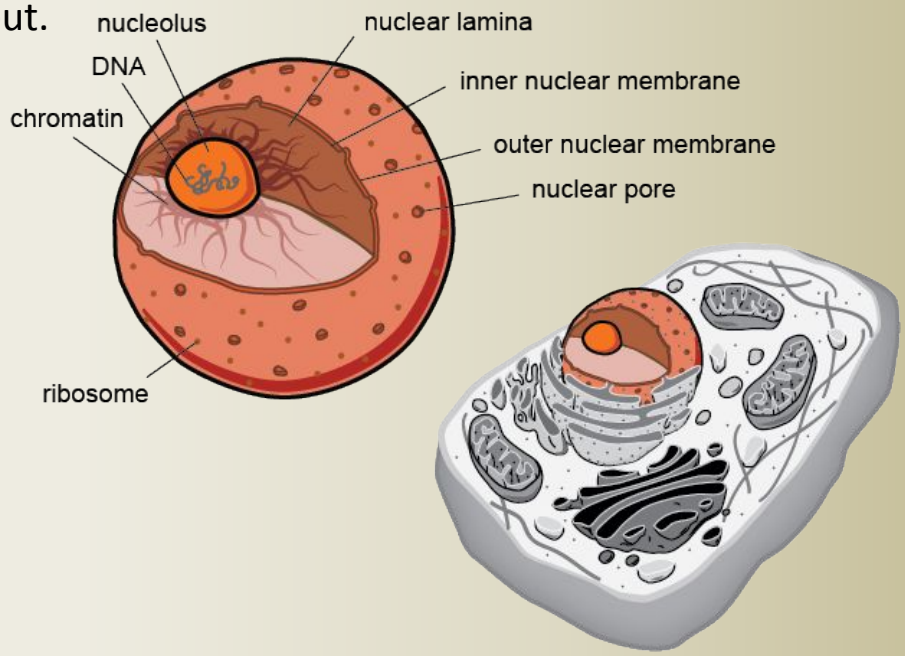
- Plants
- Animals
- Fungi (mushrooms, etc.)
- Protists (algae, plankton, etc.)

Most plants, animals, and fungi are composed of many cells and are, for that reason, aptly classified as **multicellular**, while most protists consist of a single cell and are classified as **unicellular**.

The Nucleus and Eukaryotic Genetic Material

The nucleus stores all the information the cell needs to grow, reproduce, and function. This information is contained in long molecules of DNA. One of the functions of the nucleus is to protect the cell's DNA from damage, but that is not all that it does.

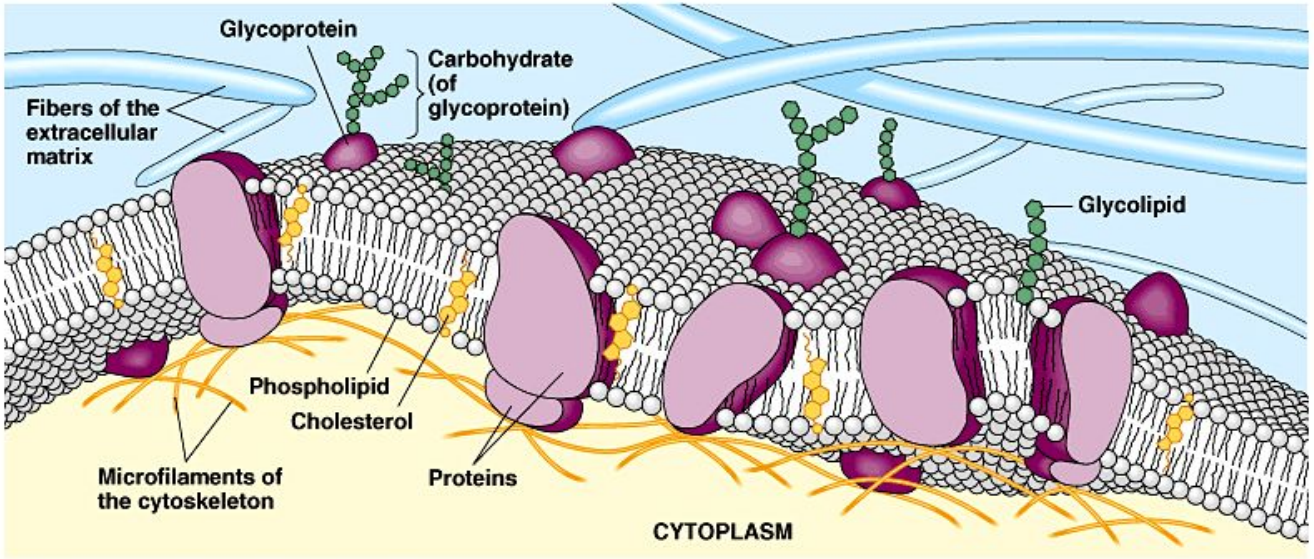
The nucleus also contains a small round body called a nucleolus that holds nucleic acids and proteins. The nuclear membrane has pores through which the contents of the nucleus communicate with the rest of the cell. The nuclear membrane tightly controls what gets into the nucleus and what gets out.



Eukaryotic Plasma Membrane

The plasma membrane in eukaryotic cells is responsible for controlling what gets into and out of the cell. A series of proteins stuck in the membrane help the cell communicate with the surrounding environment. Among other things, this communication can include:

- Sending and receiving chemical signals from other eukaryotic cells
- Interacting with the cells of prokaryotic organisms during the process of infection.



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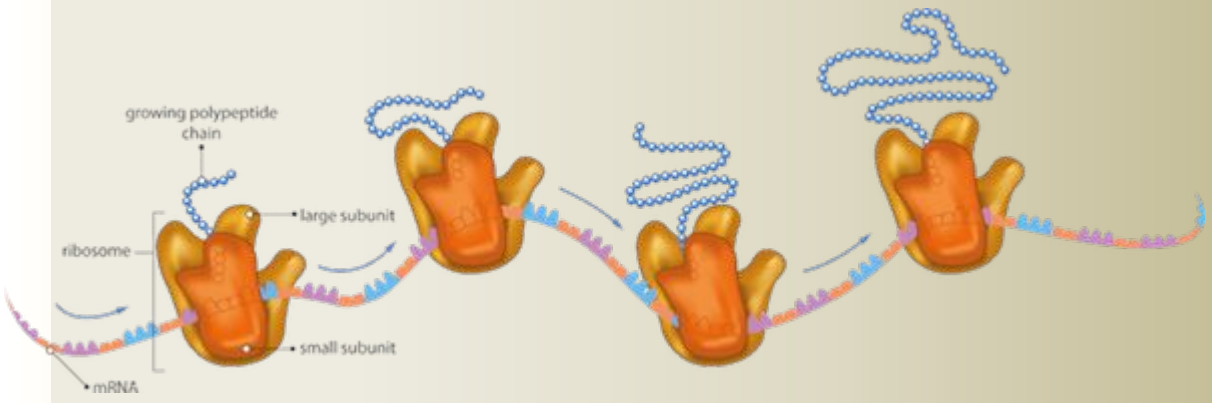
Eukaryotic Ribosomes

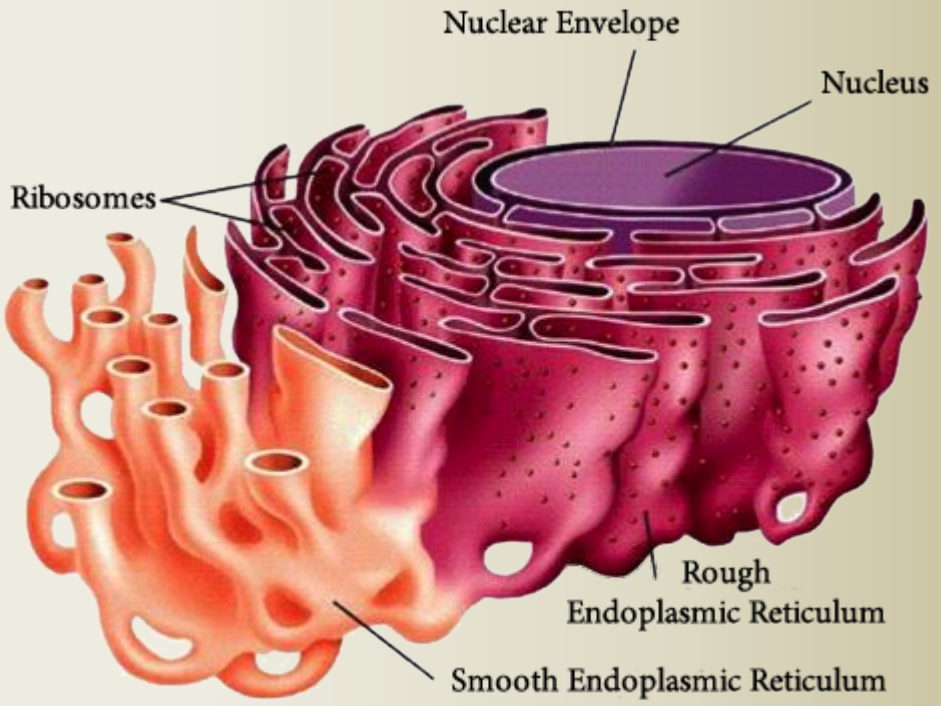
Ribosomes are small cellular machines made of proteins and ribosomal RNA. All cells, both eukaryotic and prokaryotic, have ribosomes. Eukaryotic ribosomes are larger and have a slightly different shape and composition than those found in prokaryotic cells. Eukaryotic ribosomes, for instance, have about twice the amount of ribosomal RNA (rRNA) and one third more ribosomal proteins.



Endoplasmic Reticulum

Another **organelle** in the cell is the **endoplasmic reticulum** (ER). While the function of the **nucleus** is to act as the cell brain, the ER functions as a manufacturing and packaging system. Structurally, the endoplasmic reticulum is a network of membranes found throughout the cell and connected to the nucleus.

There are two basic types of ER. Both rough ER and smooth ER have the same types of membranes but they have different shapes. Rough ER looks like sheets or disks of bumpy membranes while smooth ER looks more like tubes. Rough ER is called rough because it has ribosomes attached to its surface.

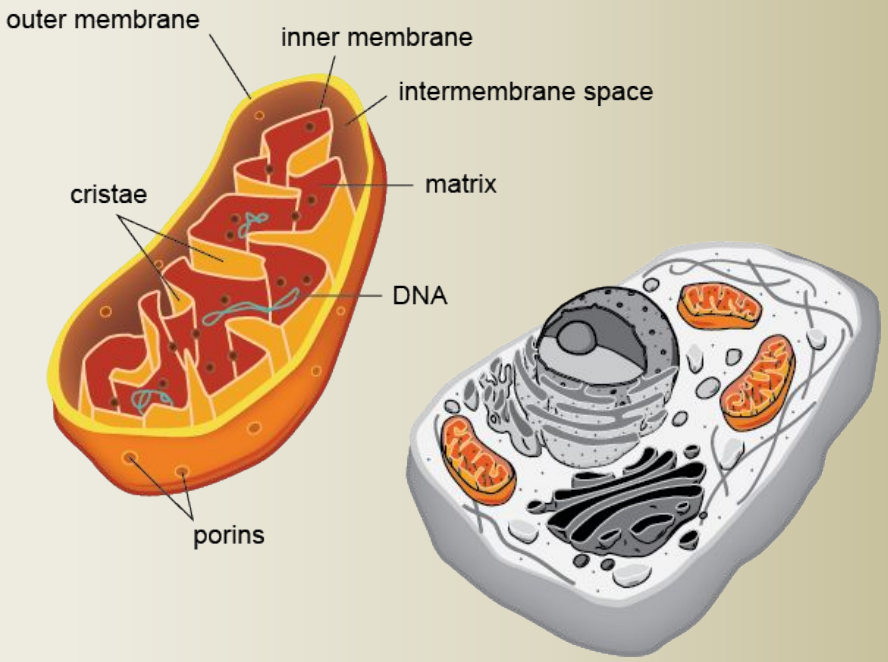


Mitochondria

Mitochondria are known as the powerhouses of the cell. They are **organelles** that act like a **digestive system** which takes in nutrients, breaks them down, and creates energy rich molecules for the cell.

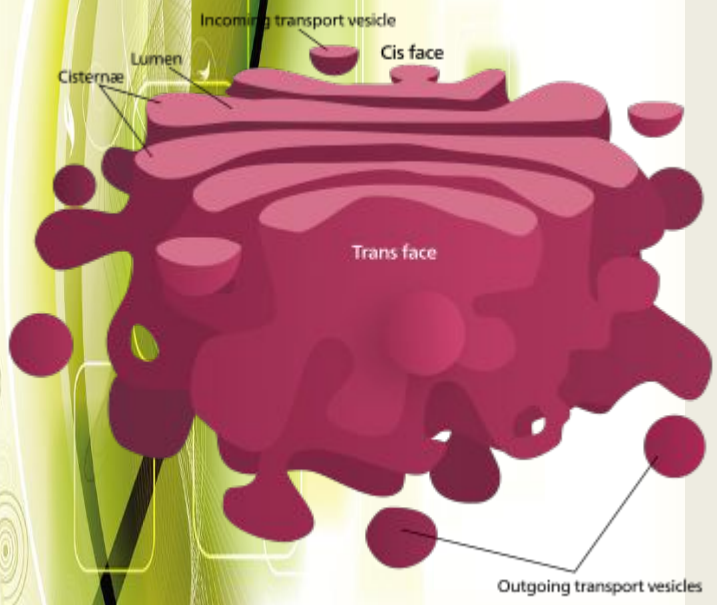
Mitochondria are shaped perfectly to maximize their productivity. They are made of two membranes. The **outer membrane** covers the organelle and contains it like a skin.

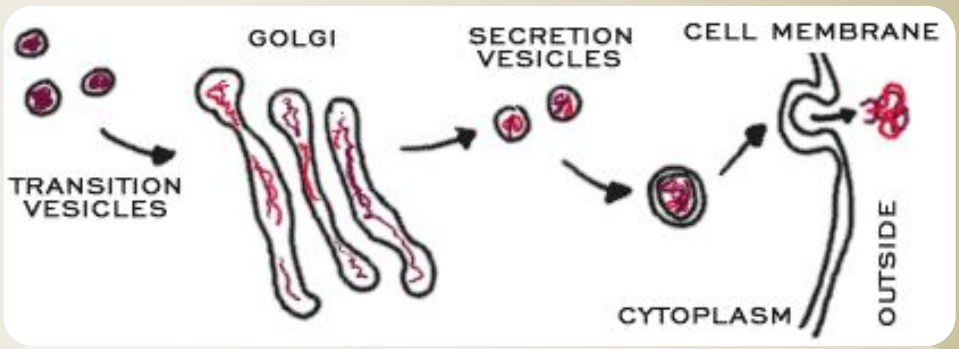
The **inner membrane** folds over many times and creates layered structures called **cristae**. The fluid contained in the mitochondria is called the **matrix**.



Golgi Apparatus

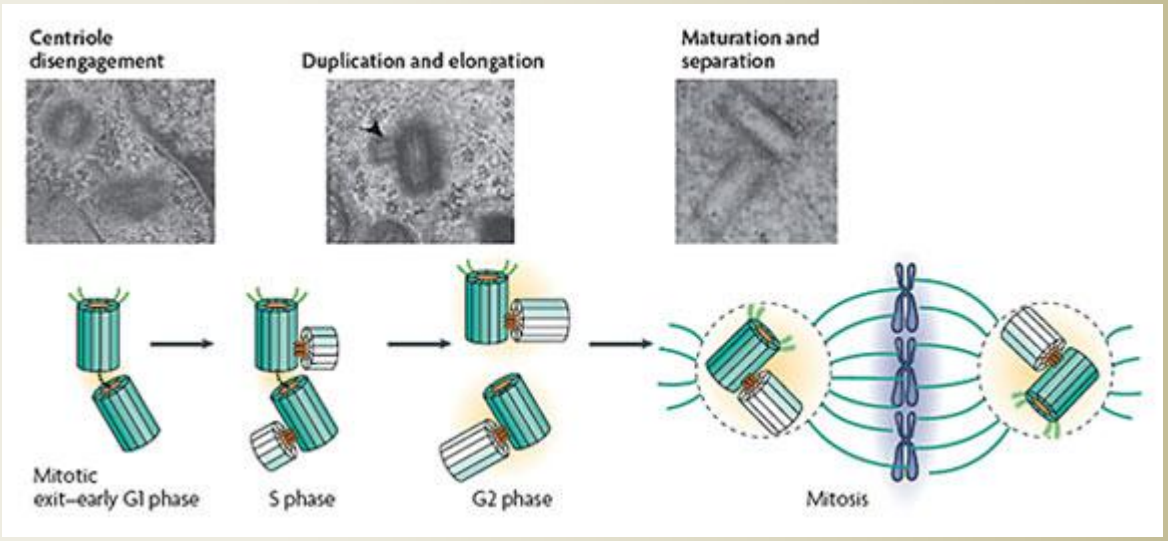
The **Golgi apparatus** or Golgi complex is found in most cells. It is another **packaging organelle** like the **endoplasmic reticulum** (ER). The Golgi apparatus gathers simple molecules and combines them to make molecules that are more complex. It then takes those big molecules, packages them in **vesicles**, and either stores them for later use or sends them out of the cell. It is also the organelle that builds **lysosomes** (cell digestion machines).





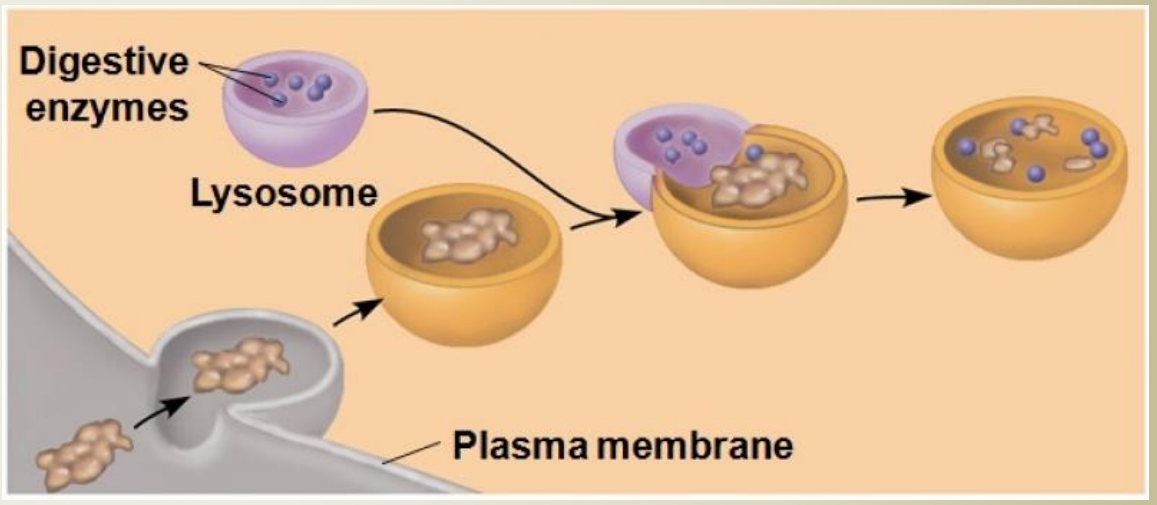
Centrioles

Every animal-like cell has two small organelles called **centrioles**. They are there to help the cell when it comes time to divide. They are put to work in both the process of **mitosis** and the process of **meiosis**. You will usually find them near the **nucleus** but they cannot be seen when the cell is not dividing.



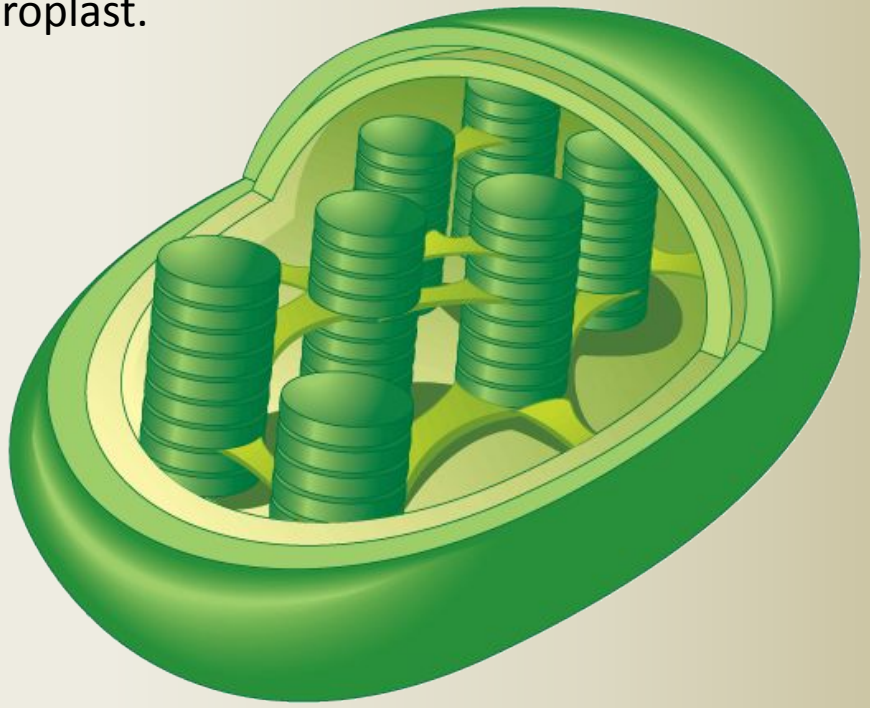
Lysosomes

Lysosomes hold **enzymes** that were created by the cell. The purpose of the lysosome is to **digest** things. They might be used to digest food or break down the cell when it dies.



Chloroplasts

Chloroplasts are the food producers of the cell. The organelles are only found in **plant** cells and some **protists** such as algae. Animal cells do not have chloroplasts. Chloroplasts work to convert light energy of the Sun into sugars that can be used by cells. The entire process is called photosynthesis and it all depends on the little green chlorophyll molecules in each chloroplast.



Vacuoles

Vacuoles are storage bubbles found in cells. They are found in both animal and plant cells but are much larger in **plant cells**. Vacuoles might store food or any variety of nutrients a cell might need to survive. They can even store waste products so the rest of the cell is protected from contamination. Eventually, those waste products would be sent out of the cell.

Peroxisomes

There are many ways that **peroxisomes** are similar to **lysosomes**. They are small vesicles found around the cell. They have a single membrane that contains digestive enzymes for breaking down toxic materials in the cell. They differ from lysosomes in the type of enzyme they hold. Peroxisomes hold on to enzymes that require oxygen (**oxidative enzymes**). Lysosomes have enzymes that work in oxygen-poor areas and lower pH.

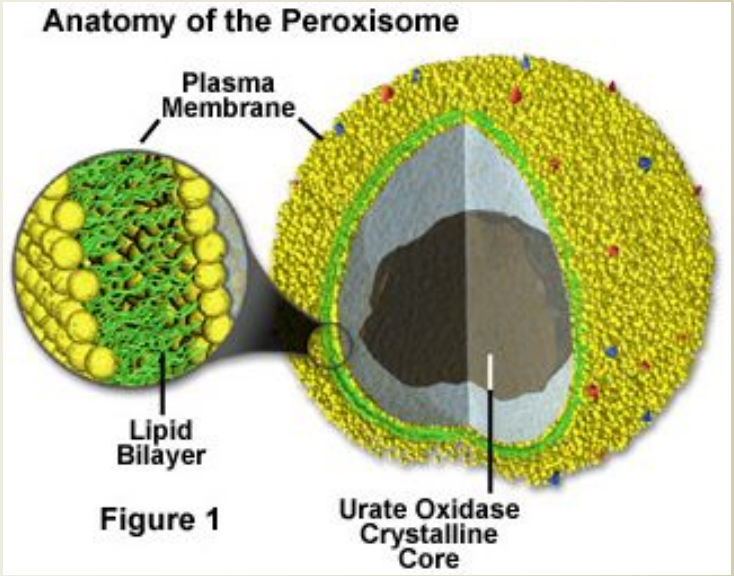


Figure 1

Conclusions

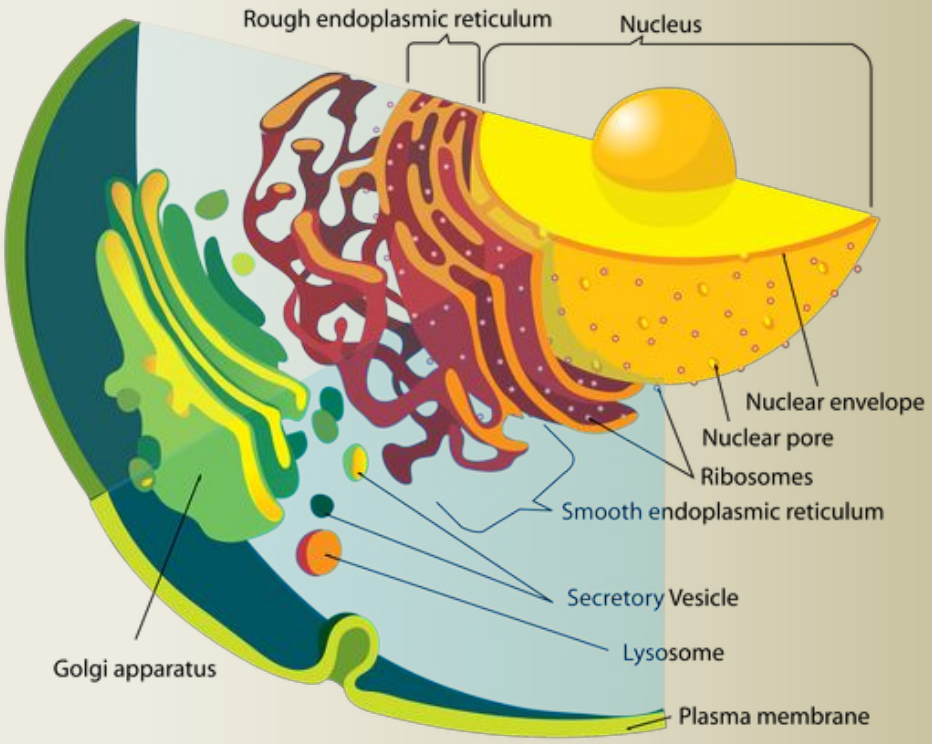
All eukaryotic cells have:

- Genetic material
- A nucleus
- A plasma membrane
- Ribosomes (80S)
- Cytoplasm, including the cytoskeleton

Most eukaryotic cells also have other membrane-bound internal structures called **organelles**.

Organelles include:

- Golgi bodies
- Mitochondria
- Lysosomes
- Endoplasmic reticulum
- Vesicles



Thank for your attention!