

Organelle Classification

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Organelles & Functions

Nucleus (Eukaryotic) - Stores generic information.

Nucleolus (Eukaryotic) - Makes ribosomes

Cytoplasm - (All Cells) Contains the contents of the cell

Cytosol (All Cells) - Gel like matrix that holds water and nutrients

Cytoskeleton (Eukaryotic) Structure, support and transport.

Ribosome (All Cells) - Makes proteins

Rough E.R (Eukaryotic) - Makes proteins for the Endo Membrane system

Smooth E.R (Eukaryotic) - Detoxifies the cell and makes lipids

Golgi Apparatus (Eukaryotic) - sorts and ships proteins

Mitochondria (Eukaryotic) - Makes energy

Lysosomes (Eukaryotic, animal cells only.) - Removes unwanted material and waste.

Peroxisome (Eukaryotic) - Regulate biochemical pathways that involve oxidation

Vacuoles (Eukaryotic) - Store water, nutrients and waste.

Vesicles (Eukaryotic) - Transport materials around the cell

Cell Membrane (All) - A thin flexible barrier that separates the cell from it's environment.

Cell Wall (Plants, fungi and prokaryotes) - Rigid barrier that protects the cell.

Large Central Vacuole (Plants only) - stores water and regulates turgor pressure

Chloroplasts (plants only) - Makes food using the process of photosynthesis.





The nucleus is arguably the most important organelle in the cell. It is the control center, telling all of the other organelles what to do and when to do it.

The nucleus also contains all of the cell's genetic material or its DNA. This material has all the instructions the cell needs for making proteins and many other important molecules.

The nucleus is surrounded by two membranes. These membranes have many openings in them, which allow for the transport of materials into and out of the nucleus. RNA, proteins, and other molecules move out of the nucleus, into the rest of the cell.

The cell's chromosomes are also found in the nucleus. These condensed strands of DNA are what contains all of the cell's genetic information.

When the cell is in its growing phase, the DNA is elongated into very thin, hair-like structures. When the cell is getting ready to divide, the DNA condenses into chromosomes and the material gets duplicated.

Within the nucleus of eukaryotic cells is a structure called the nucleolus. This is the site of ribosome formation.

Prokaryotic cells lack a nucleus. In these organisms (which include the bacteria), the genetic material is free-floating within the cell membrane. The genetic material of prokaryotes is a different shape than that of eukaryotes, but it serves the same function.

Outside of the nucleus but within the cell membrane is a gel-like substance called cytoplasm. It is made mostly of water and dissolved salts. It bathes the organelles and keeps them healthy. It is also the medium through which materials move about the cell.

Within the cytoplasm is a network of tiny tubes called the cytoskeleton. These tubes are used to give the cell structure and also to support the organelles by holding them into place. Some parts of the cytoskeleton also work to transport certain things between different parts of the cell.

The cytoskeleton is made from two different components: microtubules and microfilaments. Microtubules are hollow and made of protein. They are very important in helping to maintain the cell's shape. They are also important during cell division. When this occurs, the microtubules form structures called spindle fibers, which allow the chromosomes to separate. Microtubules are also part of the different projections coming off of the cell surface. These structures, called cilia and flagella, assist with cell locomotion.

Microfilaments are very thin threads made of protein. Like the microtubules, they help the cell keep its shape.

Making proteins is a very important job for a cell. Ribosomes are small pieces of RNA found throughout the cytoplasm and on some other organelles. Their only job is to assemble proteins.

DNA coding tells them which proteins to make. Prokaryotic cells can have tens of thousands of ribosomes.

Eukaryotic cells can have hundreds of thousands, if not millions of them, all making proteins.

Once proteins are made, they need to be moved to different parts of the cell. The endoplasmic reticulum (E.R.) is a collection of lipid membranes that work to move the proteins from one area of the cell to another.

The E.R. comes in two different forms - rough and smooth. Rough E.R. has ribosomes attached to it. These ribosomes make proteins that are scheduled to leave the cell. The E.R. transports these proteins to another organelle that will package them up and ship them out. The smooth E.R. does not have any ribosomes on its surface. This is where the lipid part of the cell membrane is assembled.

Once the ribosomes on the E.R. have made the proteins for the cell to export, they need to be packaged in such a way that they can leave the cell and be taken in by the parts of the body that need them. The organelle responsible for this is called the Golgi apparatus (or Golgi bodies), which looks like a stack of pancakes. The Golgi apparatus changes, sorts and packages the proteins as they leave the E.R. so they are ready to leave the cell. Because it is so important to shipping things out of the cell, the Golgi apparatus is always found near the cell membrane.

Cell parts wear out and die. These pieces of 'garbage' need to be disposed of somehow. That is the job of the lysosomes. These structures are filled with digestive enzymes that break down those items that would become toxic if they were left in the cell. Lysosomes also break down proteins, lipids, and carbohydrates into more usable forms for the cell.