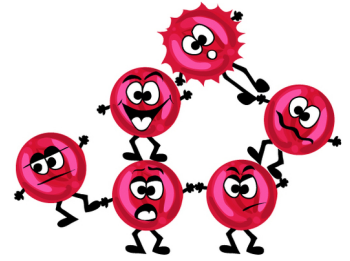


# Eukaryotes

When scientists first started to classify life, everything was designated as either an animal or a plant. But as new forms of life were discovered and our knowledge of life on Earth grew, new categories, called "**Kingdoms**," were added. There eventually came to be five **Kingdoms** in all - **Animalia**, **Plantae**, **Fungi**, **Protista**, and **Bacteria**.



The five **Kingdoms** were generally grouped into two categories called **Eukarya** and **Prokarya**. **Eukaryotes** represent four of the five **Kingdoms** (animals, plants, fungi and protists). **Eukaryotes** are **organisms** whose cells have a **nucleus** -- a sort of sack that holds the cell's **DNA**. Animals, plants, protists and fungi are all **eukaryotes** because they all have a **DNA**-holding nuclear **membrane** within their cells. **Organisms** in the other two **kingdoms**, Bacteria and Archaea, are all **unicellular** and lack this more complex internal structure.



©Cory Thomas \* IllustrationsOf.com/214938

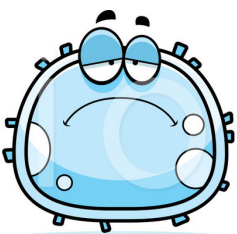
Organisms composed of **eukaryotic** cells are divided into 4 main groups:

- 1 **Protista** are mostly **unicellular** or colonial **eukaryotes**. They may be either **photosynthetic autotrophs** or **heterotrophs**. This is a very diverse group that is actually composed of multiple **kingdoms**.
- 2 **Plantae** are mostly **multicellular**, **photosynthetic autotrophs**. Like colonial organisms, **multicellular organisms** are composed of many cells. However, in a **multicellular organism** there is considerable **specialization** and division of labor among the cells.
- 3 **Fungi** are mostly **multicellular heterotrophs** that secrete digestive **enzymes** and digest their food outside the body before absorbing it through the body surface.
- 4 **Animalia** are mostly **multicellular heterotrophs** that digest their food inside an internal digestive tract.

How do cells accomplish all their functions in such a tiny, crowded package?

Eukaryotic cells — those that make up cattails and apple trees, mushrooms and dust mites, halibut and Ms. Salzburg — have evolved ways to partition off different functions to various locations in the cell. In fact, specialized compartments called **organelles** exist within **eukaryotic cells** for this purpose.

Different **organelles** play different roles in the cell — for instance, **mitochondria** generate energy from food molecules; **lysosomes** break down and recycle **organelles** and **macromolecules**; and the **endoplasmic reticulum** helps build **membranes** and transport proteins throughout the cell. Moreover, nearly all **eukaryotic organelles** are separated from the rest of the **cellular** space by a **membrane**, in much the same way that interior walls separate the rooms in a house.



illustrations of.com #1089243

Like the **plasma membrane**, **organelle membranes** function to keep the inside "in" and the outside "out." This partitioning permits different kinds of **biochemical** reactions to take place in different **organelles**. Although each **organelle** performs a specific function in the cell, all of the cell's **organelles** work together in an integrated fashion to meet the overall needs of the cell.