Eukaryotes Encyclopedia Article

Eukaryotes

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Eukaryotes

Eukaryotae, or eukaryotic cells, are large and complex cells bounded by an outer plasma membrane. They contain many organelles within their cytoplasm and a **nucleus** separated from the cytoplasm by the nuclear membrane. Fossils of eukaryotic cells are present in rocks dated as 1.5 billion years old. All living things on Earth, except **bacteria** and blue-green algae (cyanobacteria), which are Prokaryotae, are composed of eukaryotic cells.

The nucleus of a eukaryotic **cell** is a membrane-bound compartment containing genetic information in the form of **DNA** organized into chromosomes. The nuclei of eukaryotic cells divide by **mitosis**, a process which results in two daughter nuclei that are identical to the parent cell. The cell's nucleus directs its overall functioning, while the membrane-bound organelles in the cytoplasm carry out a variety of specialized jobs in a coordinated fashion.

In plants, organelles called chloroplasts trap the energy from sunlight in a process called photosynthesis. Plants then use that energy to drive metabolic pathways. In both animal and plant eukaryotic cells, the cellular energy is generated by organelles called **mitochondria**. Other organelles, the lysosomes, are membrane-bound packages of digestive **enzymes**. These digestive enzymes, and other proteins, are manufactured in the **ribosomes** located on the rough endoplasmic reticulum, a kind of cellular highway. An organelle called the Golgi complex then moves the enzymes--and other proteins--into the membranes and distributes them.

Some eukaryotic cells have a flagellum, whip-like projection from the cell membrane that aids in the cell's locomotion. Others may have cilia, shorter, hair-like strands arranged around the perimeter of the cell in a characteristic way. The cilia of prokaryotic cells are less complex than those of eukaryotic cells.

The types and arrangement of a cell's organelles enable eukaryotic cells of multicellular organisms to perform specialized functions. In humans, the eukaryotic cells of a number of organs are highly specialized, but nevertheless maintain most of the defining features of the eukaryotic cell. For example, the cells of the brain, liver, bone, muscle of a growing baby divide by mitosis under the control of the DNA in the nucleus, with the liver cells producing more liver cells, and bone cells producing other bone cells.