Plant Cell Structures

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Printed: October 29, 2013

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CONCEPT 1 Plant Cell Structures

- Distinguish plant cells from animal cells.

Do plants have cells like yours?

Yes, your cells are actually very similar to a plant's cells. For example, they are both eukaryotic cells, both contain DNA in a nucleus, and both make proteins in ribosomes. However, plant cells also differ in some crucial ways from your own cells.

Plant Cells

Even though plants and animals are both eukaryotes, plant cells differ in some ways from animal cells (**Figure** 1.1). Plant cells have a large central vacuole, are surrounded by a cell wall, and have chloroplasts, which are the organelles of **photosynthesis**.

Vacuoles

First, plant cells have a large central **vacuole** that holds a mixture of water, nutrients, and wastes. A plant cell's vacuole can make up 90% of the cell's volume. The large central vacuole essentially stores water. What happens when a plant does not get enough water? In animal cells, vacuoles are much smaller.

Cell Wall

Second, plant cells have a **cell wall**, while animal cells do not (**Figure** 1.2). The cell wall surrounds the plasma membrane but does not keep substances from entering or leaving the cell. A cell wall gives the plant cell strength and protection.

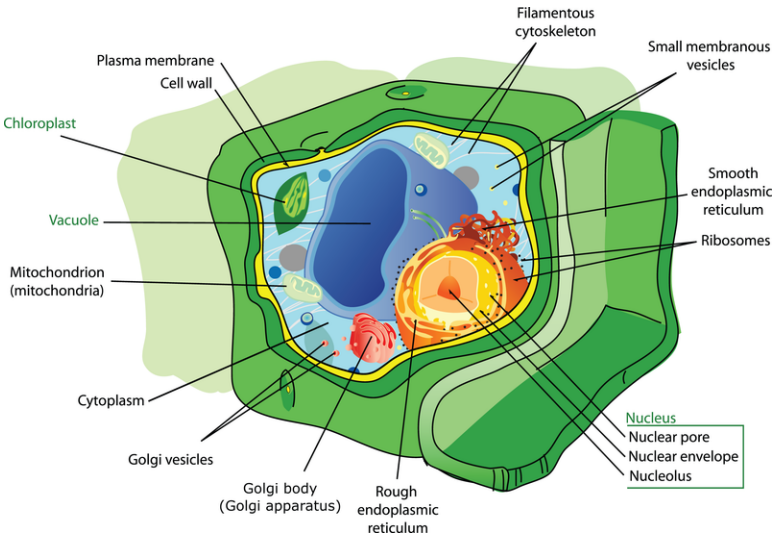

FIGURE 1.1

A plant cell has several features that make it different from an animal cell, including a cell wall, huge vacuoles, and chloroplasts, which photosynthesize.

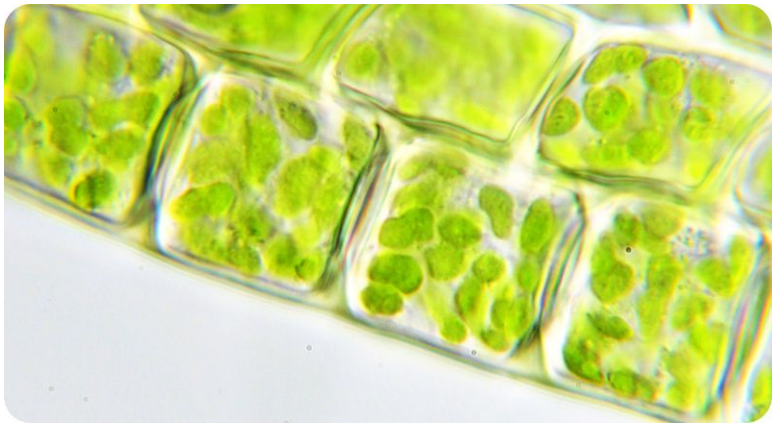

FIGURE 1.2

In this photo of plant cells taken with a light microscope, you can see green chloroplasts, as well as a cell wall around each cell.

Plastids

A third difference between plant and animal cells is that plants have several kinds of organelles called **plastids**. And there are several different kinds of plastids in plant cells. For example, **Chloroplasts** are needed for photosynthesis, leucoplasts can store starch or oil, and brightly colored chromoplasts give some flowers and fruits their yellow, orange, or red color. It is the presence of chloroplasts and the ability to photosynthesize, that is one of the defining features of a plant. No animal or fungi can photosynthesize, and only some protists are able to. The photosynthetic protists are the plantlike protists, represented mainly by the unicellular algae.

Vocabulary

- **cell wall**: Tough outer layer of plant cells that helps support and protect the cell; also found around bacterial cells.
- **chloroplast**: Organelle that carries out photosynthesis in plants.
- **photosynthesis**: Process by which specific organisms (including all plants) use the sun's energy to make their own food from carbon dioxide and water; process that converts the energy of the sun, or solar energy, into carbohydrates, a type of chemical energy.

- **plastid**: Small membrane-bound organelle of plant cells with varying functions.
- **vacuole**: Membrane-bound space within the cell used for storage of water, wastes, and nutrients.

Summary

- Plant and animal cells differ in that plants have a large central vacuole, while animals have smaller vacuoles.
- Plant cells also have cell walls and plastids, while animal cells do not.

Practice

Use the resource below to answer the following questions.

- **Plant and Animal Cell Animation - Cells alive** at http://www.cellsalive.com/cells/cell_model.htm

1. Compare and contrast the vacuoles of plant cells and the vacuoles of animal cells.
2. How is the appearance of thylakoids similar to the appearance of the Golgi apparatus?
3. What kind of membrane do chloroplasts have? What other organelle has a similar type of membrane?
4. What features do plant cells have in common with animal cells?

Review

1. What are three structures that are found in plant cells but not in animal cells?
2. What are some possible functions for plastids?

References

1. Mariana Ruiz Villarreal (LadyofHats). . Public Domain
2. Kelvin Song. . CC-BY 3.0