Plant Cells

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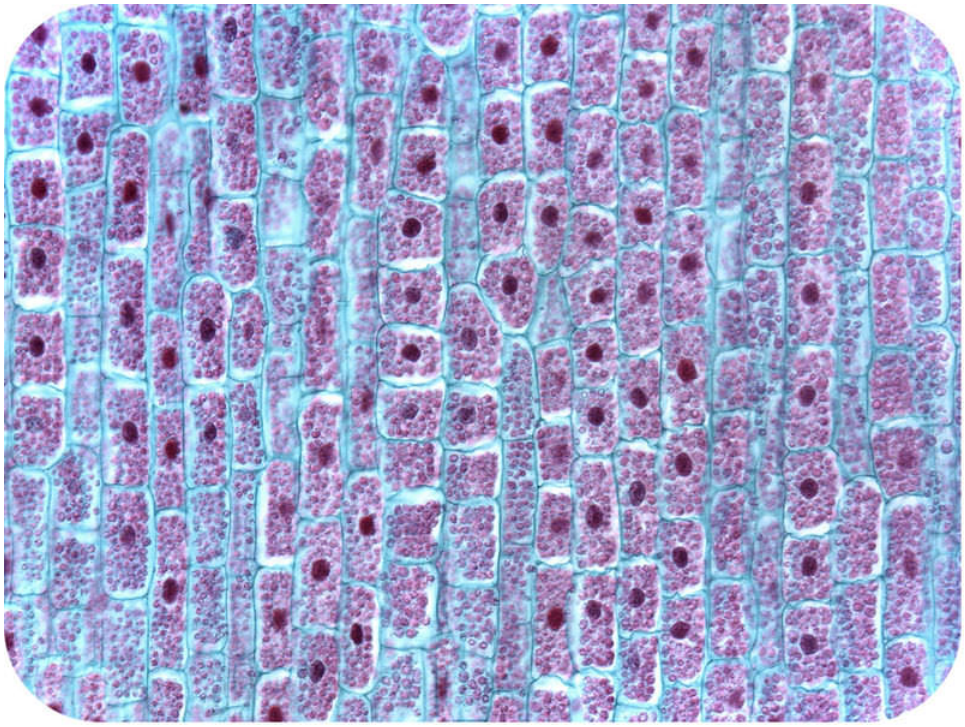
CHAPTER 1 Plant Cells

- Describe plant cell structures, and list types of plant cells.
- Explain the roles of the central vacuole, cell wall, and chloroplast.



Why do plant cells look like little rectangles?

A section of a pine embryo. Notice how all the cells seem to stack on each other, with no spaces in between. MIght this allow the cells to form structures that can grow upright?

Organs in Plants?

Your body includes organ systems, such as the digestive system, made of individual organs, such as the stomach, liver, and pancreas, which work together to carry out a certain function (in this case, breaking down and absorbing food). These organs, in turn, are made of different kinds of tissues, which are groups of cells which work together to perform a specific job. For example, your stomach is made of muscle tissue to facilitate movement and glandular tissue to secrete enzymes for chemical breakdown of food molecules. These tissues, in turn, are made of cells specialized in shape, size, and component organelles, such as mitochondria for energy and microtubules for movement.

Plants, too, are made of organs, which in turn are made of tissues. Plant tissues, like ours, are constructed of specialized cells, which in turn contain specific organelles. It is these cells, tissues, and organs that carry out the dramatic lives of plants.

Plant Cells

Plant cells resemble other eukaryotic cells in many ways. For example, they are enclosed by a plasma membrane and have a nucleus and other membrane-bound organelles. A typical plant cell is represented by the diagram in **Figure** 1.1.

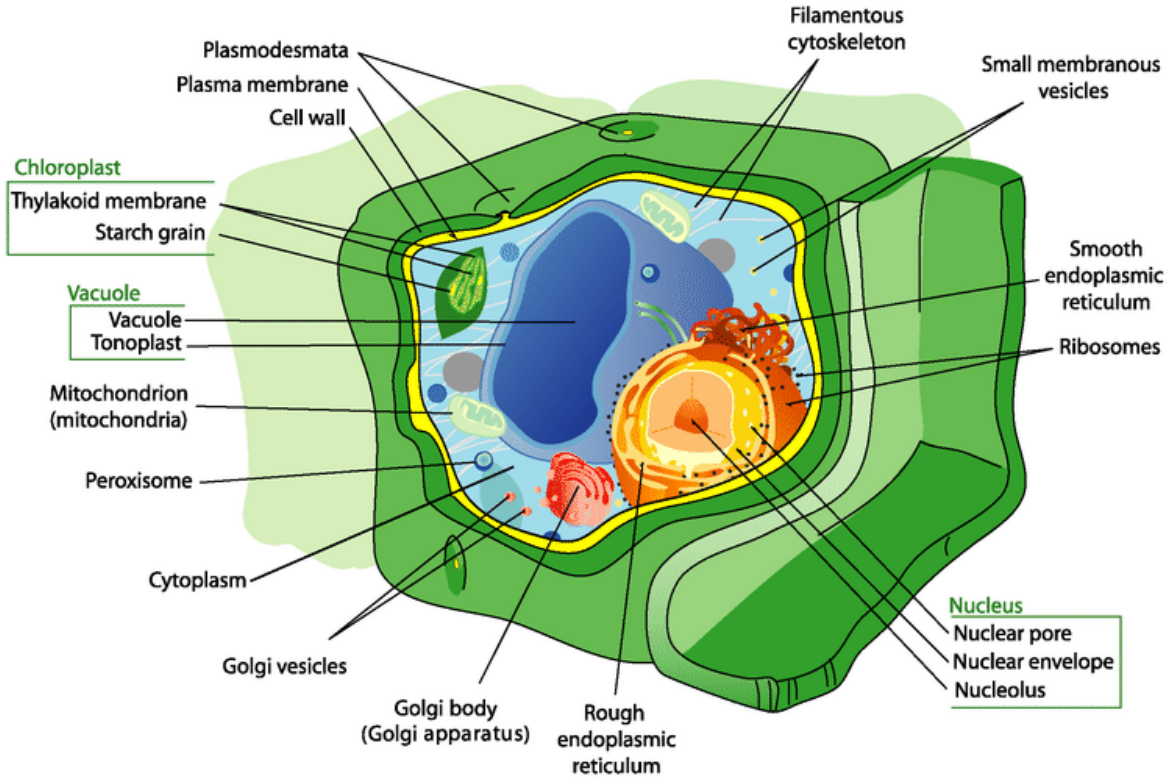


FIGURE 1.1

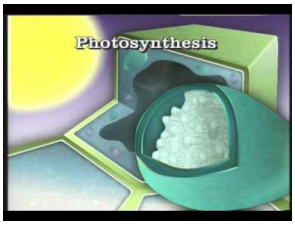
Plant cells have all the same structures as animal cells, plus some additional structures. Can you identify the unique plant structures in the diagram?

Plant Cell Structures

Structures found in plant cells but not animal cells include a large central vacuole, cell wall, and plastids such as chloroplasts.

- The large **central vacuole** is surrounded by its own membrane and contains water and dissolved substances. Its primary role is to maintain pressure against the inside of the cell wall, giving the cell shape and helping to support the plant.
- The **cell wall** is located outside the cell membrane. It consists mainly of **cellulose** and may also contain **lignin**, which makes it more rigid. The cell wall shapes, supports, and protects the cell. It prevents the cell from absorbing too much water and bursting. It also keeps large, damaging molecules out of the cell.

- **Plastids** are membrane-bound organelles with their own DNA. Examples are chloroplasts and chromoplasts. **Chloroplasts** contain the green pigment **chlorophyll** and carry out **photosynthesis**. Chromoplasts make and store other pigments. They give flower petals their bright colors.



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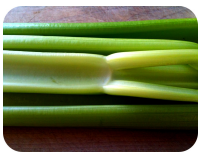
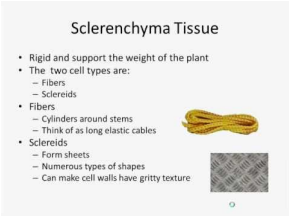
Types of Plant Cells

There are three basic types of cells in most plants. These cells make up ground tissue, which will be discussed in another concept. The three types of cells are described in **Table** 1.1. The different types of plant cells have different structures and functions.

TABLE 1.1: Types of Plant Cells

Type of Cell	Structure	Functions	Example
Parenchymal	cube-shaped loosely packed thin-walled relatively unspecialized contain chloroplasts	photosynthesis cellular respiration storage	food storage tissues of potatoes 
Collenchymal	elongated irregularly thickened walls	support wind resistance	*strings* running through a stalk of celery 
Sclerenchymal	very thick cell walls containing lignin	support strength	tough fibers in jute (used to make rope) 



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Summary

- Plants have eukaryotic cells with large central vacuoles, cell walls containing cellulose, and plastids such as chloroplasts and chromoplasts.
- Different types of plant cells include parenchymal, collenchymal, and sclerenchymal cells. The three types differ in structure and function.

Review

1. Identify three structures found in plant cells but not animal cells. What is the function of each structure?
2. Describe parenchymal plant cells and state their functions.

References

1. Mariana Ruiz Villarreal (User:LadyofHats/Wikimedia Commons). Parts of a plant cell . Public Domain