

# PLANT CELLS

Every living thing is made up of tiny structures called **cells**. A plant has a number of different types of cells, and each one plays an important part in keeping it alive, such as absorbing water and minerals or making food.

## CELL STRUCTURE

Plant cells have many features in common with animal cells, but are generally larger. Plant cells also have a number of unique structures, most of which help the plant to make its own food.

Around each plant cell is a **cell wall**. This is made of a tough substance called **cellulose**, and helps the cell to keep its shape. Directly beneath the cell wall is a thin layer called the **cell membrane**. Animal cells also have a cell membrane, but they do not have a cell wall.

**Vacuoles** are fluid-filled sacs. Most plant cells have one large, permanent vacuole filled with a sugary liquid called **cell sap**, which is made up of water and dissolved substances.

Typical plant cell (cutaway – not to scale)



All plant cells, like animal cells, have a **nucleus**, which controls the activities inside the cell. The nucleus is surrounded by a gel-like fluid called **cytoplasm**, within which smaller structures, called **organelles**, are moved and arranged. These have different functions.

**Chloroplasts**, for example, are organelles which contain a green chemical called **chlorophyll**. These give plants their color and help to make food.

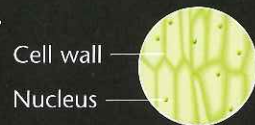


Chloroplast

**Chromoplasts** have a similar function. They give some flowers, and vegetables such as carrots, their particular color.

### See for yourself

You can use a microscope to look at plant cells. First, you need a slice of raw onion. Take one segment from the slice, and use tweezers to remove the thin membrane that covers it. Place the membrane on a glass microscope slide and look at it through a microscope, lighting it from beneath. You may be able to see the nucleus and the cell walls.



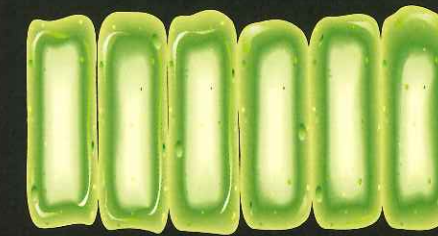
This is what leaf cells look like under a microscope. The dark spots inside the cells are the nuclei.

## SPECIALIZED CELLS

Not all plant cells are exactly alike. Some have different shapes and structures, allowing them to do particular jobs. This is called **specialization**.

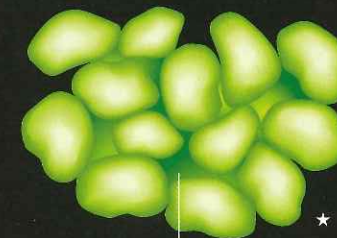
Palisade cells, for example, are found just beneath the upper surface of a leaf. They are column shaped, and contain a large number of chloroplasts.

Palisade cells



Spongy cells are found inside a leaf, beneath the layer of palisade cells. They have an irregular shape, which allows air spaces to form between them.

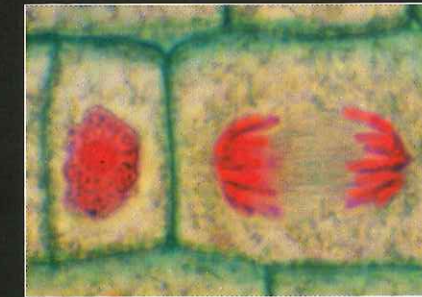
Spongy cells



Air space

## CELL DIVISION

Cells can divide to create new cells for growth or repair. Cell division happens in two stages. In the first stage, called **mitosis**, the nucleus divides into two parts, each becoming a new nucleus. Each of the two new nuclei, called **daughter nuclei**, are identical to the original.



This microscope image shows the contents of a nucleus dividing in two.

In the second stage of cell division, called **cytokinesis**, a dividing line called the **cell plate** forms. This runs down the middle of the cytoplasm. New cell walls build up along the cell plate, to separate the two new cells.

### Cytokinesis in a plant cell

Plant cell after mitosis has taken place



Cell plate forming



New cell wall forming

## PLANT TISSUE

Cells of the same kind join together to form types of **tissue**. Most plants are made up of three types of tissue: dermal, ground and vascular.

**Dermal tissue** makes up the surface layer of most plants.

Dermal tissue



**Ground tissue** packs out most of the inside of younger plants.

Ground tissue



**Vascular tissue** is responsible for transporting food, water and other substances around the plant. For more about this, see page 12.

Vascular tissue



### Internet links

Go to [www.usborne-quicklinks.com](http://www.usborne-quicklinks.com) for links to the following Web sites:

**Web site 1** Electron microscope images of various cells.

**Web site 2** An overview of eukaryotic cells (those which contain nuclei), with interesting images.

**Web site 3** Clear, visual descriptions of parts of cells.

**Web site 4** More clear, visual descriptions of parts of cells.

**Web site 5** A guide to plant cells and cell division, with movies and images.