1.3 Cell Parts and Cell Size

DidYouKnow?

The structures that Robert Hooke saw in a piece of bark were not living cells at all, but only the cell walls of dead, empty plant cells.

Cells are like factories in which the business of life is always going on. Every cell must carry out certain activities that keep it alive. These activities include obtaining materials and supplies of energy, making products, and getting rid of wastes. To carry out these functions, cells have some basic structures in common. Structures inside the cell are known as **organelles**. Each organelle has a role to play in the activities necessary for life. Many of the details of cell organelles have only been discovered since the invention of the electron microscope. Look closely at the diagrams on these two pages to see which organelles are found in both plant and animal cells. Which parts are found only in plant cells?

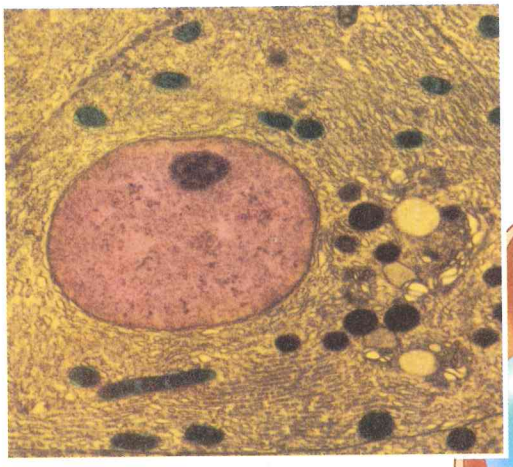
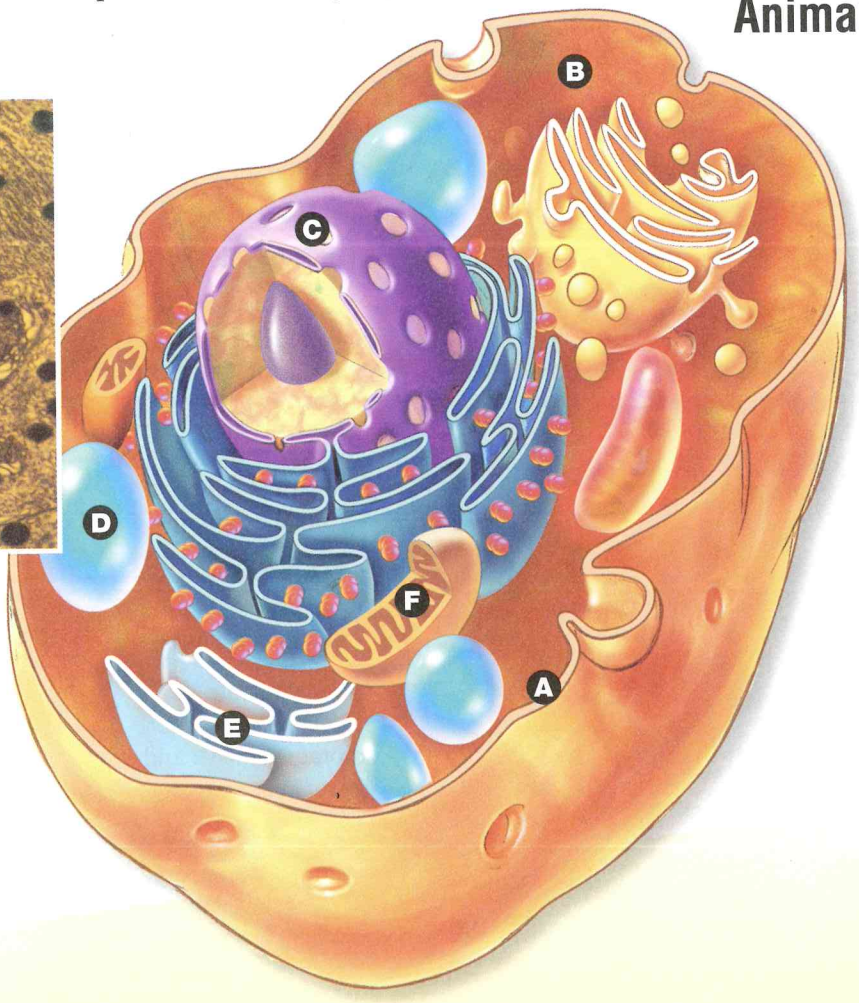


Figure 1.10A A microscopic view of an animal cell (300×)

Animal Cell



A Cell membrane

Like the skin covering your body, the **cell membrane** surrounds and protects the contents of the cell. The cell membrane is not simply a container, however. Its structure helps control the movement of substances in and out of the cell.

B Cytoplasm

A large part of the inside of the cell is taken up by the jellylike **cytoplasm**. Like the blood flowing throughout your body, cytoplasm constantly moves inside the cell. The cytoplasm distributes materials such as oxygen and food to different parts of the cell. The cytoplasm also helps support all the other parts inside the cell.

C Nucleus

A large, dark, round **nucleus** is often the most easily seen structure in a cell. The nucleus controls the cell's activities. It contains the **chromosomes** — structures made of genetic material that direct a cell's growth and reproduction. The cell nucleus is enclosed by a **nuclear membrane**, which controls what enters and leaves the nucleus.

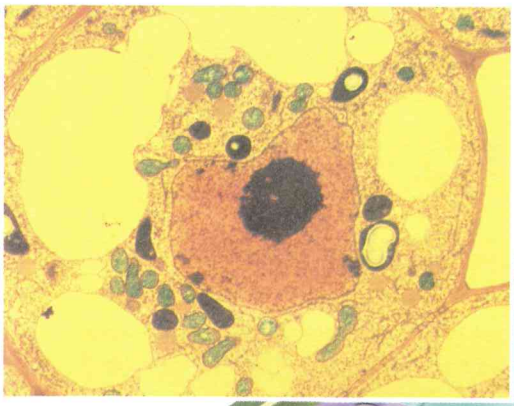
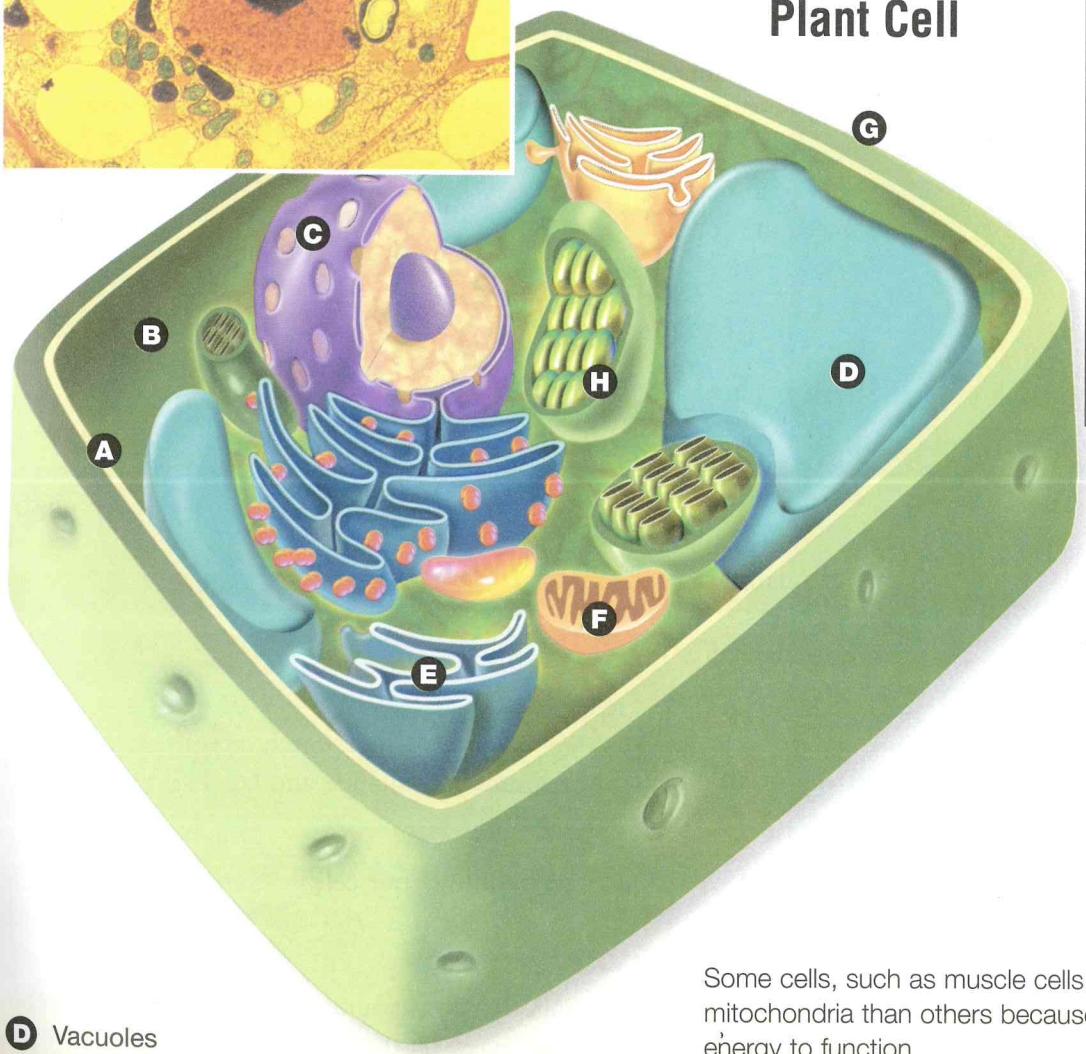


Figure 1.10B A microscopic view of a plant cell (1945×)



DidYouKnow?

A tree consists mainly of dead cells. The strength and rigidity of wood come from the cell walls. These cell walls remain stacked together solidly like bricks, long after the cells have ceased to carry out their living functions. The only living parts of a tree are the leaves, the growing tips of branches and roots, a thin layer of cells just under the bark, and the pith in the centre of the roots and the branches.

D Vacuoles

Balloonlike spaces within the cytoplasm are storage places for surplus food, wastes, and other substances that the cell cannot use right away. These structures, called **vacuoles**, are surrounded by a membrane.

E Endoplasmic reticulum

The **endoplasmic reticulum** is a folded membrane that forms a system of canals within the cytoplasm. Materials are transported through these canals to different parts of the cell, or to the outside of the cell.

F Mitochondria

Because cells do work, they need energy. Their energy is produced by oval-shaped organelles called **mitochondria** (singular: mitochondrion). Inside the mitochondria, tiny food particles are broken down to release their chemical energy for the cell's activities.

Some cells, such as muscle cells, have more mitochondria than others because they need more energy to function.

G Cell wall

The **cell wall** occurs only in the cells of plants and fungi, and in some unicellular organisms. Cell walls are much thicker and more rigid than cell membranes, and are made mostly of a tough material called **cellulose**. They provide support for the cell.

H Chloroplasts

Chloroplasts are the structures in which the process of photosynthesis takes place. Photosynthesis uses energy from the Sun to make carbohydrates. Folded membranes inside each chloroplast contain the green pigment chlorophyll, which absorbs sunlight. Chloroplasts are found only inside cells in green plants and in some unicellular organisms. They are not found in animal cells.