

CELL

- Cells are the fundamental unit of life.
- They range in size from 0.0001 mm to nearly 150 mm across.
- Cells are the structural, functional, and biological units of all living beings.
- A cell can replicate itself independently. Hence, they are known as the building blocks of life.

Cell Definition

“A cell is defined as the smallest, basic unit of life that is responsible for all of life’s processes.”

Discovery of Cells

Discovery of cells is one of the remarkable advancements in the field of science. It helps us know that all the organisms are made up of cells, and these cells help in carrying out various life processes. The structure and functions of cells helped us to understand life in a better way.

Who discovered cells?

Robert Hooke discovered the cell in 1665. Robert Hooke observed a piece of bottle cork under a compound microscope and noticed minuscule structures that reminded him of small rooms. Consequently, he named these “rooms” as cells. However, his compound microscope had limited magnification, and hence, he could not see any details in the structure. Owing to this limitation, Hooke concluded that these were non-living entities.

Later Anton Van Leeuwenhoek observed cells under another compound microscope with higher magnification. This time, he had noted that the cells exhibited some form of movement (motility). As a result, Leeuwenhoek concluded that these microscopic entities were “alive.” Eventually, after a host of other observations, these entities were named as animalcules.

In 1883, Robert Brown, a Scottish botanist, provided the very first insights into the cell structure. He was able to describe the nucleus present in the cells of orchids.

Characteristics of Cells

Following are the various essential characteristics of cells:

- Cells provide structure and support to the body of an organism.
- The cell interior is organised into different individual organelles surrounded by a separate membrane.
- The nucleus (major organelle) holds genetic information necessary for reproduction and cell growth.
- Every cell has one nucleus and membrane-bound organelles in the cytoplasm.
- Mitochondria, a double membrane-bound organelle is mainly responsible for the energy transactions vital for the survival of the cell.
- Lysosomes digest unwanted materials in the cell.
- Endoplasmic reticulum plays a significant role in the internal organisation of the cell by synthesising selective molecules and processing, directing and sorting them to their appropriate locations.

Types of Cells

Cells are similar to factories with different labourers and departments that work towards a common objective. Various types of cells perform different functions. Based on cellular structure, there are two types of cells:

- Prokaryotes
- Eukaryotes

Prokaryotic Cells

1. Prokaryotic cells have no nucleus. Instead, some prokaryotes such as bacteria have a region within the cell where the genetic material is freely suspended. This region is called the nucleoid.
2. They all are single-celled microorganisms. Examples include archaea, bacteria, and cyanobacteria.
3. The cell size ranges from 0.1 to 5 μm in diameter.
4. The hereditary material can either be DNA or RNA.
5. Prokaryotes generally reproduce by binary fission, a form of asexual reproduction. They are also known to use conjugation – which is often seen as the prokaryotic equivalent to sexual reproduction (however, it is NOT sexual reproduction).

Eukaryotic Cells

1. Eukaryotic cells are characterised by a true nucleus.
2. The size of the cells ranges between 10–100 μm in diameter.
3. This broad category involves plants, fungi, protozoans, and animals.
4. The plasma membrane is responsible for monitoring the transport of nutrients and electrolytes in and out of the cells. It is also responsible for cell to cell communication.
5. They reproduce sexually as well as asexually.
6. There are some contrasting features between plant and animal cells. For e.g., the plant cell contains chloroplast, central vacuoles, and other plastids, whereas the animal cells do not.

Difference between Prokaryotic and Eukaryotic Cells

	Prokaryotes	Eukaryotes
Type of Cell	Always unicellular	Unicellular and multi-cellular
Cell size	Ranges in size from 0.1 μm – 5.0 μm in diameter	Size ranges from 10 μm – 100 μm in diameter
Cell wall	Usually present; chemically complex in nature	When present, chemically simple in nature
Nucleus	Absent. Instead, they have a nucleoid region in the cell	Present
Ribosomes	Present. Smaller in size and spherical in shape	Present. Comparatively larger in size and linear in shape
DNA arrangement	Circular	Linear
Mitochondria	Absent	Present
Cytoplasm	Present, but cell organelles absent	Present, cell organelles present
Endoplasmic reticulum	Absent	Present
Plasmids	Present	Very rarely found in eukaryotes
Lysosome	Lysosomes and centrosomes are absent	Lysosomes and centrosomes are present

Cell division	Through binary fission	Through mitosis
Flagella	The flagella are smaller in size	The flagella are larger in size
Reproduction	Asexual	Both asexual and sexual
Example	Bacteria and Archaea	Plant and Animal cell

Cell Structure

The cell structure comprises individual components with specific functions essential to carry out life's processes. These components include- cell wall, cell membrane, cytoplasm, nucleus, and cell organelles. Read on to explore more insights on cell structure and function.

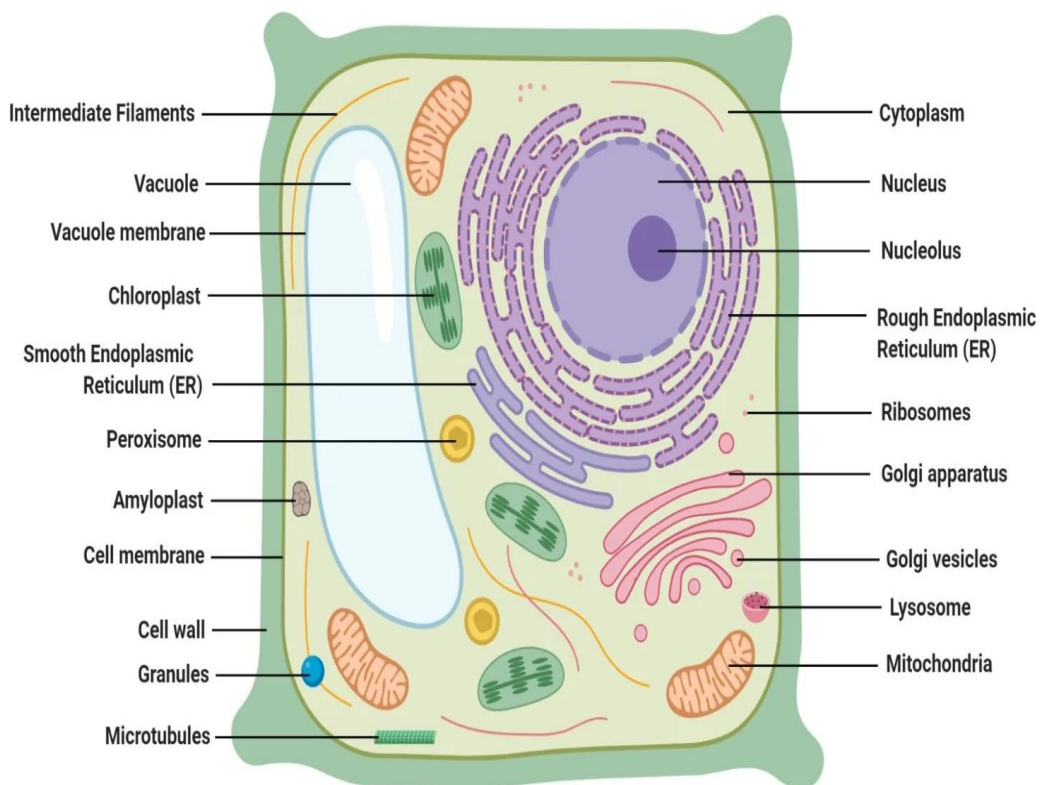


Fig. A Typical Plant Cell