CHAPTER

13

THE LIVING AND NON-LIVING

The characteristics of living and non-living things are discussed within chapter.

The term living thing refers to things that are now or once were alive. A Non-living thing is anything that was never alive. In order for something to be classified as living, it must grow and develop, use energy, reproduce and is made up of cells. Living and Non-living things interact with each other all the time.

Cell

- The cell is the basic structural and functional unit of all living organisms.
- It is the smallest unit of life and is the building block of the body organisms.
- **Robert Hooke** coined the term cell, when he saw honey-comb-like structure in the section of cork with his primitive microscopes.

Structure of and Function of cell

It deals with the shape, size and parts and their function of cell.

Shape and Size of Cells

- The cell may vary in their shapes. They are round or spherical, (*eg.* RBCs) spindle-shaped, (in muscle cells), long branched, (in nerve cells, etc.
- WBC's or White Blood Cells and *Amoeba* are able to change their shape.
- Size of cell is related to its function.

- The largest known cells are unfertilised **ostrich egg** cells (size 6 inch diameter).
- The smallest cell is of Pleuro Pneumonia Like Organisms (**PPLO**) also called Mycoplasma gallisepticum. It measures about 0.1-0.3 μm.
- **Human nerve cell** is the longest animal cell.
- Largest unicellular plant is *Acetabularia* (10 cm) and animal is *Amoeba* (1 mm).
- The largest human cell is the **female ovum** (1mm) and the smallest human cell is the **red blood cell**.

Parts of Cell

The various components of plant and animal cells are described below

Cell Wall

- It is a characteristic feature of only plant cells and fungi.
- It is an outer thick additional layer surrounding the plasma membrane.
- It protects the cell against wind, temperature, variation, moisture conditions and also provides shape and rigidity to cells.

Cell Membrane

- It is the outer boundary of the cell enclosing the cytoplasm and nucleus.
- It is also called plasma membrane.
- It is semi-permeable, i.e. allows certain substances to move inward and outward.
- It helps to separate cells from each other and their surrounding medium.

Cytoplasm

It is a jelly-like substance present between cell membrane and nucleus containing various cell organelles.

Nucleus

- It was discovered by **Robert Brown** (1831).
- It contains nucleoplasm, nucleolus and chromatin material.
- All this material is covered up by a nuclear membrane.
- Chromatin is the **controlling centre of cell** as it forms chromosomes.

Chromosome

- It is thread-like structure, found in the nucleus of the cell.
- Bead-like structures found on chromosome are called **genes**, which are made up of DNA and are the carrier of genetic information from generation to generation.
- Chromosomes are units of inheritance.

Cell Organelles

A cell performs different functions with the help of various small highly specialised structures called organelles present in the cytoplasm. Some of these are as given below

Vacuoles

- These are sac-like structures, containing a solution of mineral salts and sugars (i.e. cell sap). In **plant cells,** the vacuoles are large distinct and permanent, occupying most of the volume of the cell.
- On the contrary, an **animal cell** has small and temporary vacuoles or it may be absent.

Plastids

They occur in most plant cells and are absent in animal cells. They are of different colours and types as given below

- **Chromoplasts** These are the coloured plastids(except green), give fruit and flower their colour.
- **Leucoplasts** These are the colourless plastids, store food.
- **Chloroplasts** These are the green coloured plastids also called kitchen of the cell.
  They contain the green pigment, chlorophyll that is essential for photosynthesis and provides green colour to the leaves.

Comparison of Plant Cells and Animal Cells

There are certain features that distinguish a plant cell from animal cell as listed below is the table

Plant Cell	Animal Cell
A plant cell has rigid wall on the outside.	A cell wall is absent.
It cannot change its shape.	An animal cell can often change its shape.
Plastids are found in plant cells.	Plastids are usually absent.
A mature cell has large central vacuoles.	An animal cell may have many small vacuoles.
Reserve food is generally starch and fat.	Reserve food is usually glycogen and fat.

Prokaryotic and Eukaryotic Cell

On the basis of type of nucleus, cells are classified into two types

(i) **Prokaryotes** (*Pro*-primitive, *karyon*-nucleus) The cells having nuclear material without nuclear membrane are called prokaryotic cells, e.g. bacteria and blue-green algae.

(ii) **Eukaryotes** (*Eu*-true, *karyon*-nucleus) The cells having well-organised nucleus with nuclear membrane are called eukaryotic cells, e.g. all the organisms except bacteria and blue-green algae.

Cellular Composition in Different Organisms

Depending on the number of cells, organisms can be

(i) Unicellular organisms (having single cell, e.g. *Amoeba*, *Paramecium*, etc.)

(ii) Multicellular organisms (having many cells, e.g., plants, animals, man, etc.)

Thus, cells are the basic unit of life. All the vital process are performed in the cells. These make a characteristic difference between livings and non-livings.

The living beings are different from non-livings in many ways. These differences can be understand by the given table

Character	Living beings	Non-livings
Cell	Made up of cells.	Lack cells.
Organisation levels	Same type of cells performing same function form tissue which in turn form organ and organ system.	Lack organisational levels.
Growth	Growth occurs from inside.	Growth occurs from outside.
Life cycle	All organisms follow a life cycle of birth, growth, reproduction, ageing and death.	Lack a life cycle.
Reproduction	Reproduce to produce offspring of their own kind.	Do not the proses of reproduction.
Nutrition	Living beings require proper nourishment. They may be autotrophic or heterotrophic.	They do not require nourishment.
Respiration	Respire to produce energy by the break down of food.	Do not respire.
Excretion	It is the process of throwing out waste from the body.	Lack excretion.
Response to stimulus	Response to stimulus, i.e. temperature, light, water, sound, touch, etc.	Do not show any response to stimuli
Movement	Show movement	Do not show movement

PRACTICE EXERCISE

1. In living beings, growth occurs from
(a) inside
(b) outside
(c) does not occur
(d) Both (a) and (b)

2. Same type of cells performing same functions are called
(a) organ (b) tissue
(c) organ system (d) None of these

3. Who lacks a life cycle?
(a) Non-livings (b) Living beings
(c) Both (a) and (b) (d) *Amoeba*

4. The process of producing offspring of their own kind is known as
(a) excretion (b) nutrition
(c) reproduction (d) respiration

5. Living beings respire to produce
(a) offspring of their own kind
(b) energy by the break down of food
(c) food for the nutrition
(d) None of the above

6. Through which process living beings throw out waste from their body
(a) respiration (b) reproduction
(c) excretion (d) growth

7. The characteristic feature(s) of living beings is/are
(a) organisation level
(b) excretion
(c) respiration
(d) All of the above

8. In which terms, growth of living beings is different from growth of non-livings?
(a) Outside growth (b) Inside growth
(c) Both (a) and (b) (d) No growth

9. Among the following who shows response to stimulus?
(a) Earthworm (b) Man
(c) Knife (d) Both (a) and (b)

10. Which of the following objects shows movement?
(a) *Amoeba* (b) Rock
(c) Knife (d) Pen

11. Who coined the term cell
(a) Robert Brown (b) Darwin
(c) Robert Hooke (d) Lamarck

12. The smallest unit of life is
(a) tissue (b) cell
(c) organ (d) None of these

13. Among the following which cell can change its shape?
(a) White blood cell (b) *Amoeba*
(c) Nerve cell (d) Both (a) and (b)

14. The largest known cell is
(a) *Amoeba* (b) human egg
(c) Ostrich egg (d) WBC

15. The smallest cell is
(a) *Amoeba* (b) PPLO
(c) Ostrich egg (d) RBC

16. The longest animal cell is
(a) Nerve cell (Human)
(b) PPLO
(c) Red blood cell
(d) None of the above

17. The largest unicellular plant is
(a) *Acetabularia* (b) *Ectocarpus*
(c) mint (d) None of these

18. The smallest human cell is
(a) white blood cell (b) red blood cell
(c) nerve cell (d) ovum

19. Cell wall is the characteristic feature of
(a) *Amoeba* (b) animal cell
(c) *Euglena* (d) plant cell

20. The outer thick additional layer surrounding the plasma membrane in plants is
(a) cell membrane (b) cell wall
(c) envelope (d) cyst

21. The cell wall protects the cell against
(a) wind
(b) temperature
(c) moisture conditions
(d) All of the above

22. The cell membrane allows
(a) all substances to move
(b) only water to move
(c) only certain substances to move
(d) does not allow any movement

23. The membrane that helps to separate cells from, each other and their surrounding medium is
(a) cell wall
(b) cell membrane
(c) nuclear membrane
(d) None of the above

24. The jelly-like substance-between cell membrane and nucleus is
(a) cytoplasm
(b) plasma membrane
(c) cell wall
(d) None of the above

25. Who discovered nucleus?
(a) Robert Hooke (b) Robert Brown
(c) Leeuwenhoek (d) Khurana

26. The nucleus contains
(a) nucleoplasm (b) nucleolus
(c) chromatin (d) All of these

27. Which one is known as the controlling centre of the cell?
(a) cytoplasm (b) chromatin
(c) cell membrane (d) None of these

28. The bead-like structures found on chromosomes are
(a) chromasm (b) genes
(c) nucleolus (d) vacuole

29. The unit of inheritance is
(a) chromosome (b) nucleus
(c) cytoplasm (d) nucleolus

30. The large, distinct and permanent vacuoles are found in
(a) animal cells (b) sex cells
(c) plant cells (d) All of these

31. The plastid that gives colour to fruits is
(a) chloroplast
(b) chromoplast
(c) leucoplast
(d) None of the above

32. The colourless plastids that store food are
(a) Leucoplasts
(b) Chloroplasts
(c) Chromoplasts
(d) Both (a) and (b)

33. The kitchen of the cell is
(a) mitochondria (b) chloroplast
(c) leucoplast (d) chromoplast

34. The plant cell differs from animal cell in
(a) having rigid cell wall
(b) presence of plastids
(c) presence of large vacuole
(d) All of the above

35. Identify the prokaryotic cell from the following
(a) bacteria (b) blue-green algae
(c) *Amoeba* (d) Both (a) and (b)

Answers

1	*(a)*	2	*(b)*	3	*(a)*	4	*(c)*	5	*(b)*	6	*(c)*	7	*(d)*	8	*(b)*	9	*(d)*	10	*(a)*
11	*(c)*	12	*(b)*	13	*(d)*	14	*(c)*	15	*(b)*	16	*(a)*	17	*(a)*	18	*(b)*	19	*(d)*	20	*(b)*
21	*(d)*	22	*(c)*	23	*(b)*	24	*(a)*	25	*(b)*	26	*(d)*	27	*(b)*	28	*(b)*	29	*(a)*	30	*(c)*
31	*(b)*	32	*(a)*	33	*(b)*	34	*(d)*	35	*(d)*										