



UNIT 1

Life on Earth

Learning Objectives

- ◆ Characteristics of living beings
- ◆ Unicellular and multicellular organisms
- ◆ Differences in living and non-living things
- ◆ Differences in plants and animals

LIVING AND NON-LIVING THINGS

Biology is the science of life. In life science, we study the life processes of living organisms. Dogs, cats and plants are living while stone, milk, chalk are non-living. All life activities of an organism take place in a cell.

All organisms have certain characteristics by which they can be differentiated from non-living things. Let us study the characteristics of living beings.

1. Living Beings are Made up of Cells

The body of a living being is made up of tiny compartments called cells. A cell is the basic unit of life. If we examine an onion peel under a microscope, we will observe tiny compartments called cells. The term 'cell' was first coined by Robert Hooke. Each cell contains living substances called

protoplasm. Protoplasm performs all the functions of a cell. Organisms may be made up of one or many cells. Organisms which are made up of a single cell are very small and can be seen under a microscope. They are called **unicellular**. Organisms which are made up of many cells are called **multicellular**. Amoeba, paramecium and bacteria are unicellular organisms, while fish, earthworm, dog and man are multicellular organisms.

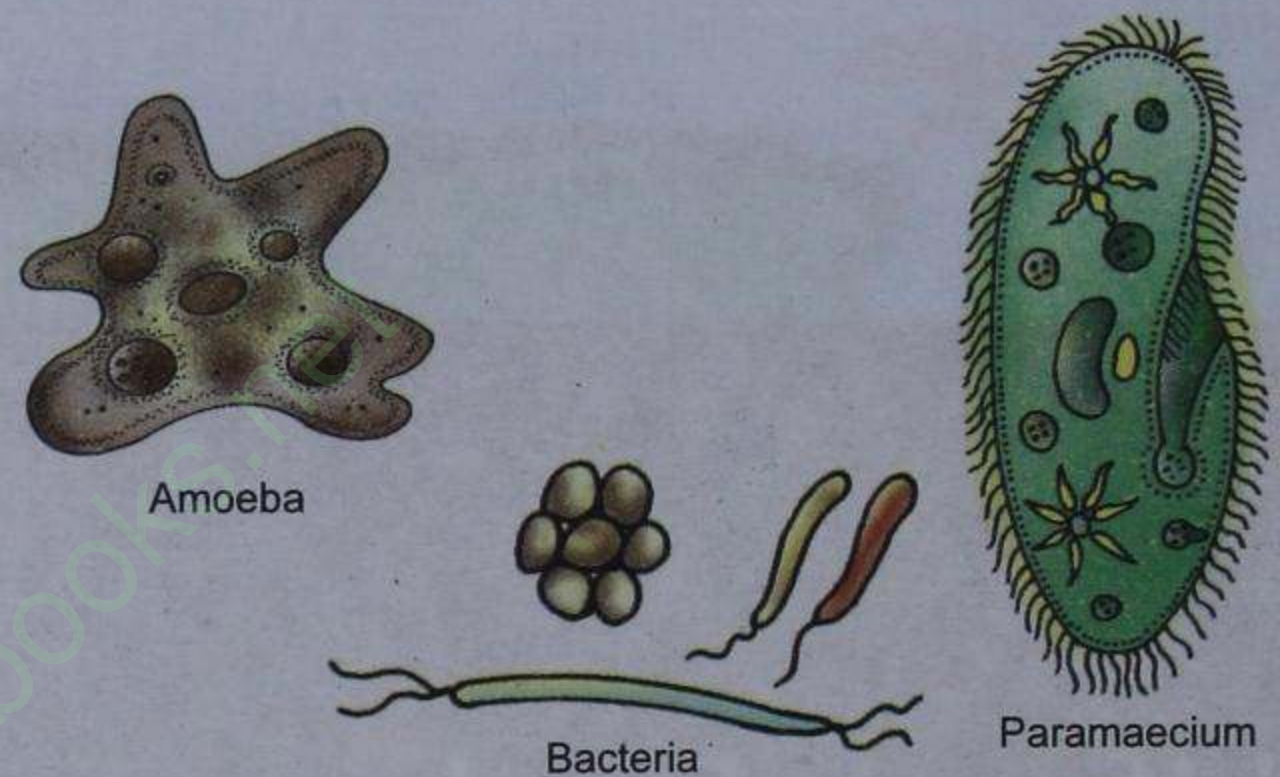


Fig. 1.1 Some unicellular organisms

ACTIVITY 1.1

Animal cells

Open your mouth and lightly scrap the inner part of your cheek with a finger or toothpick. Put the scrapings on a glass slide. Add a drop of water and cover it with a cover slip. Observe it under a microscope. Draw the structure of cheek cells which you see on the slide (Fig. 1.2). These are animal cells.

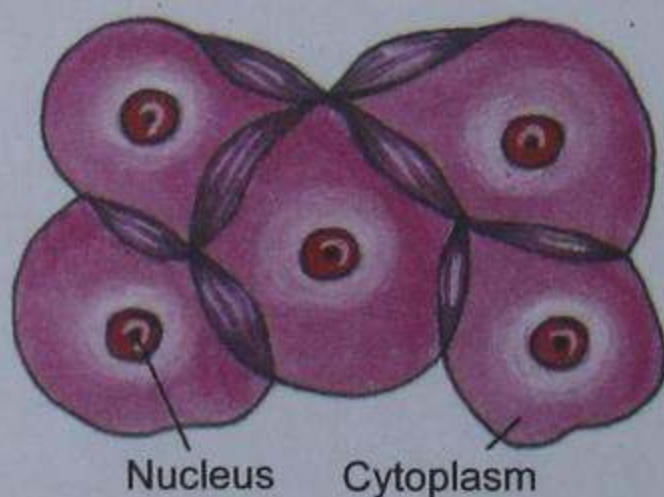


Fig. 1.2 Human cheek cells

ACTIVITY 1.2

Plant cells

Take an onion and cut it into several pieces. Take a fleshy part of it. You will see a thin paper layer on the concave side. Hold this side towards you and break the piece. Tear off the thin peel. Place a small piece of this peel on a glass slide. Put a drop of water and cover it with a cover slip. Observe it under a microscope. You will observe small chamber like structures which are called cells. These are plant cells.

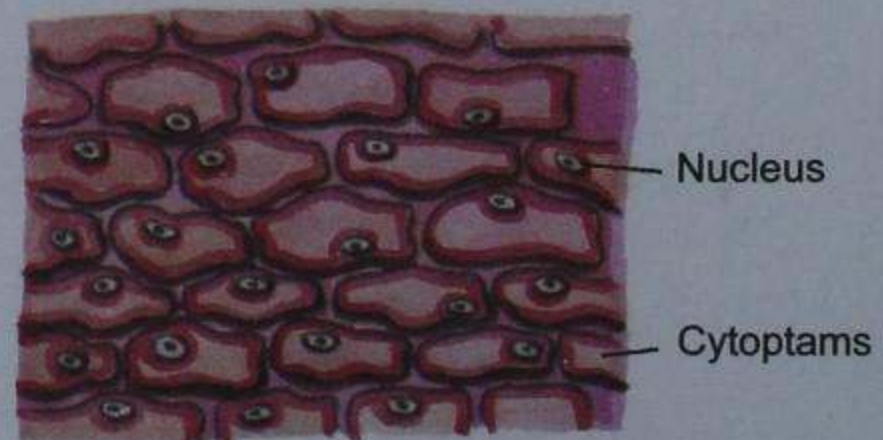


Fig. 1.3 Cells of an onion peel



Robert Hooke

(1635 – 1703)

Hooke was an English polymath who played an important role in the scientific revolution, through both experimental and theoretical work.

In 1665 he published a book entitled *Micrographia* which contained a number of microscopic and telescopic observations, and some original observations in biology. Hooke coined the biological term *cell*. He is often credited with the discovery of the cell, although his microscope was very basic. He died in London on 3rd March, 1703 (ns).

2. Growth and Changes

All living things grow. Growth is an irreversible change in size and mass. Animals and human beings grow to a certain size. Plants grow throughout their lifetime. A seedling grows into a plant. A puppy grows into a dog. Their growth is the result of cell division. As the number of cells increases, the organisms grow in size. The new cells also replace old cells resulting in the growth of a baby into a boy and a boy into an adult.



Fig. 1.4 A child and an adult

The growth in a non-living is due to the deposition of matter externally, e.g. growth of a crystal. A crystal grows in size due to

deposition of more particles on the outer surface of the crystal.

3. Living Things Move

Movement is one of the important signs of life. Animals move from one place to another in search of food and shelter. They move to protect themselves from enemies.

All plants except some floating plants remain fixed to the soil at one place. They show movement in their parts. Roots of a plant always grow towards the soil while the shoots tend to grow towards light.

Non-living objects do not move on their own. They are moved from one place to another with the help of an external force.

4. Nutrition

All living beings need food. Green plants manufacture green pigment called chlorophyll on their leaves. Plants make their own food in the presence of sunlight by using carbon dioxide from air and water from the soil. Green plants are called autotrophs or producers as they manufacture their

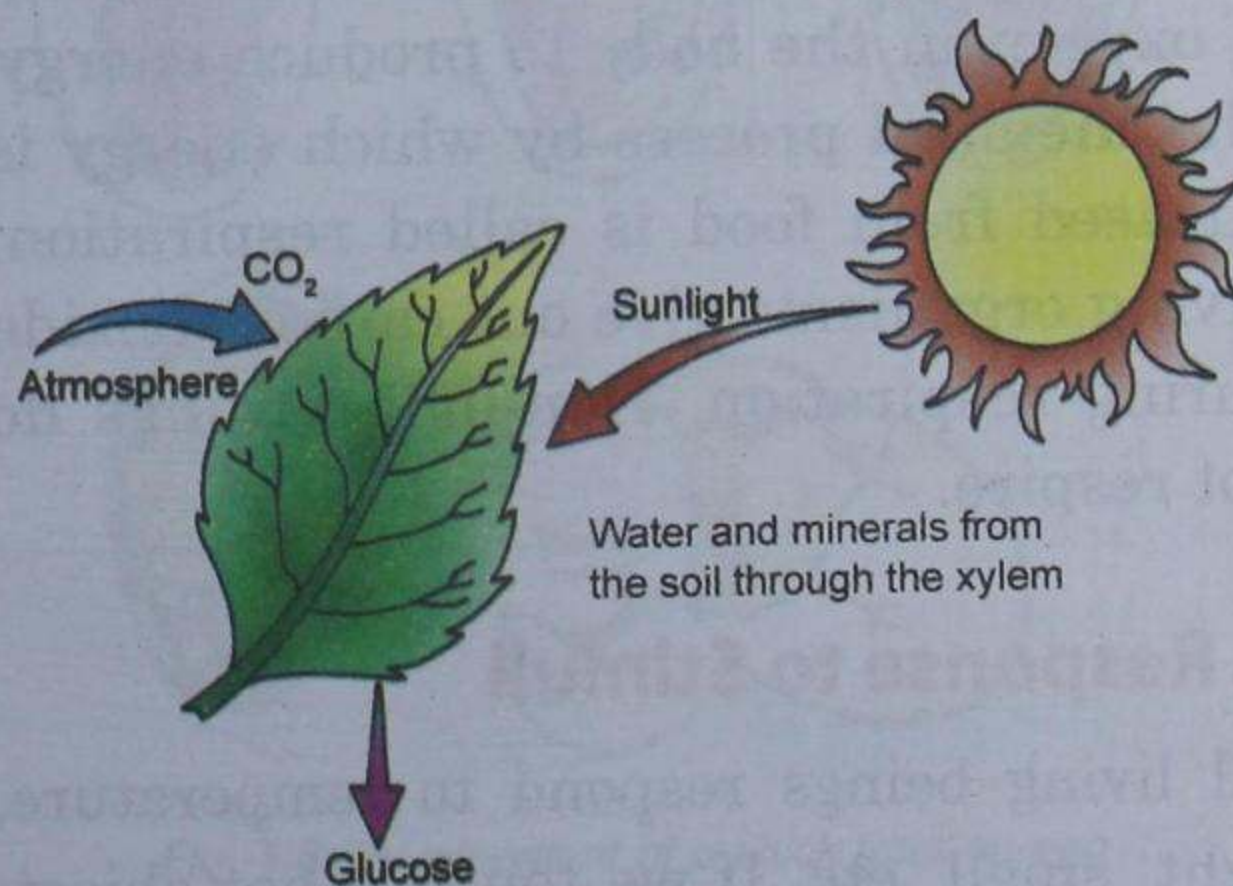


Fig. 1.5 Schematic diagram to show autotrophic nutrition in green plants

own food. Since animals do not possess chlorophyll, they cannot manufacture their own food. Animals directly or indirectly depend on plants for their food. They are called **heterotrophs** or consumers.

5. Living Things Excrete

All living organisms generate some wastes in their body in different forms. They get rid of these waste-products from their body through a system, called **excretory system**. Animals have special organs like kidneys, lungs, gills, and sweat glands to remove wastes from the body. The wastes are in the form of urine, sweat, exhaled air and solid wastes like faeces. Plants throw out their gaseous waste-products from the small openings in their leaves called **stomata**. The other excretory products of plants are gums and resins.

6. Respiration

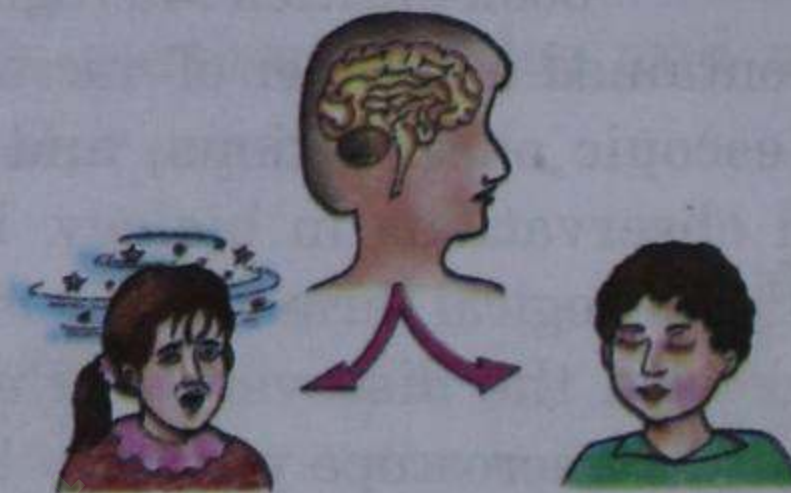
All living things need energy for their activities. The energy is obtained from food. Living beings take in oxygen during breathing. Food is oxidised with the help of oxygen in the body to produce energy. The chemical process by which energy is released from food is called respiration. Living organisms give out carbon dioxide during respiration. Non-living things do not respire.

7. Response to Stimuli

All living beings respond to temperature, light, smell, etc. If we touch a hot object, we immediately withdraw our hand. Tem-

DO YOU KNOW?

Although the brain makes only 2% of total body weight, it utilizes about 20% of the oxygen used by the body. Blood supplying oxygen to the brain also contains glucose, the principal source of energy for brain cells. If blood reaching the brain has low glucose content, dizziness, mental confusion, convulsions and loss of consciousness may occur.



perature is a stimulus. The change in the environment is called stimulus and the reaction of the organism is called response. When we feel hungry we eat. Plants also respond. The shoots of plants move toward light. Roots of plants respond to the gravity of the earth and therefore roots go deep into the earth. Leaves of a sensitive plant droop down and close on touching. Non-living things do not respond as they cannot feel anything.

KNOW YOUR SCIENTIST



Ivan Pavlov
(1849 – 1936)

He was a Russian physiologist. He first observed that living organisms respond to stimuli. Sir Jagdish Chandra Bose, an Indian scientist first observed that plants have sensitivity.

To study how plants respond to external stimuli

Take a potted *Mimosa* plant. Touch its leaves with your finger as shown in Fig. 1.6. What happens to the leaves? The leaves close up and droop. Withdraw your finger and observe it again after sometime. What change do you notice? The leaves have regained their original shape and form.

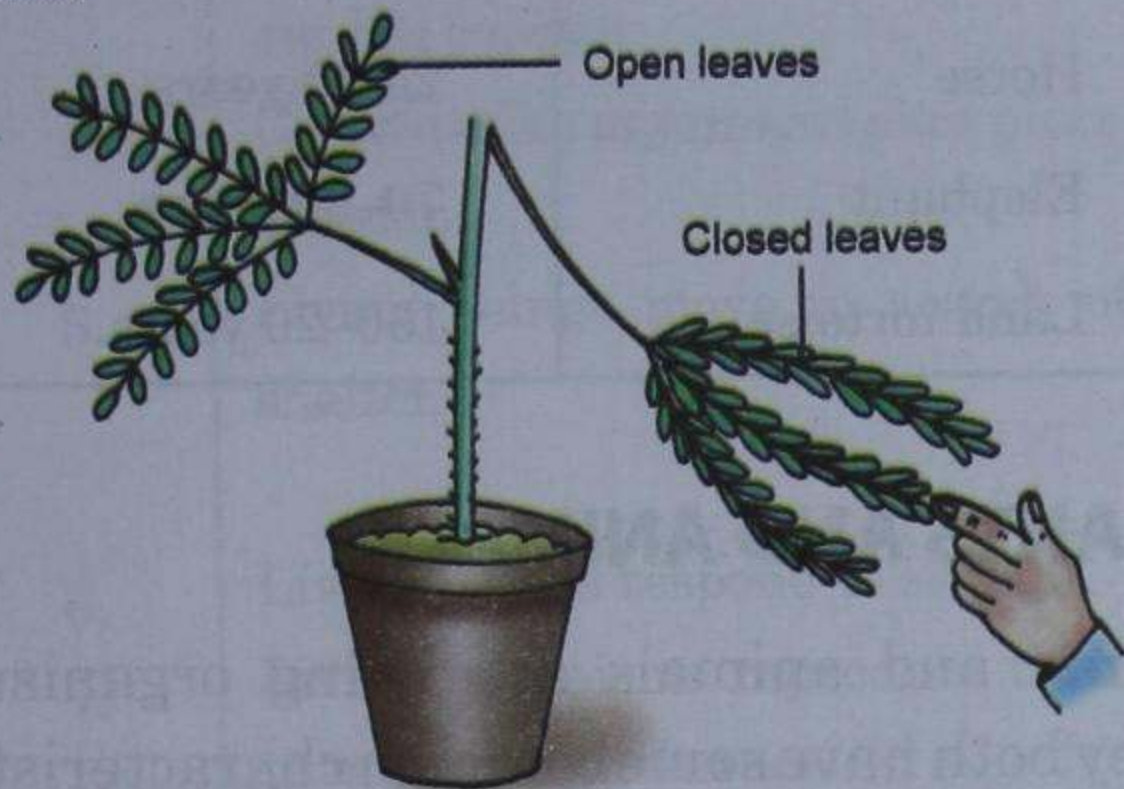


Fig. 1.6 Leaves of a sensitive plant droop down and close on touching

Shoots of plants move towards light

Take a potted plant and keep it in a dark box. Allow light to come in from one side only, through a hole as shown in Fig. 1.7. Observe the plant after a few days. You will notice that the shoot tip has bent towards light. This activity proves that shoots are phototropic, because they bend towards the direction of light. Thus, it shows movement in a plant.

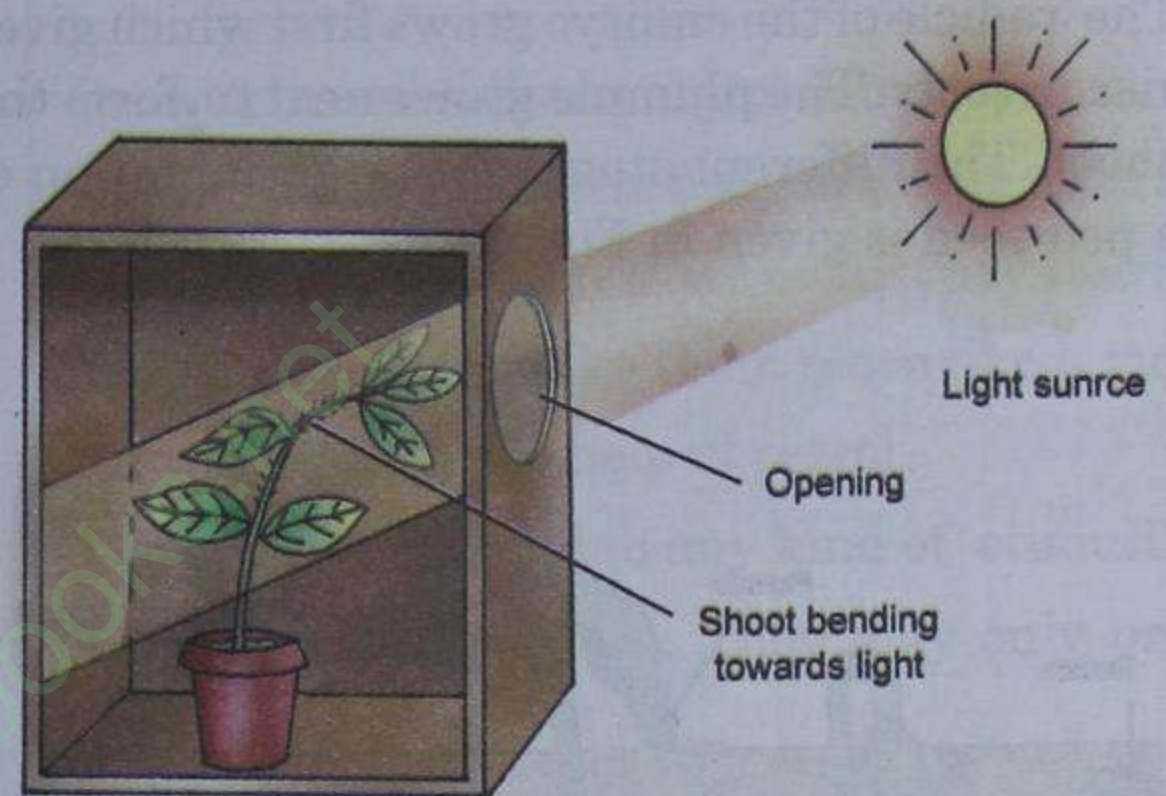


Fig. 1.7 Plant shoot is phototropic

8. Reproduction

All living things reproduce their young ones. Mammals like man, dog, cow, reproduce by giving birth to their young ones. While lizard, birds etc., lay eggs. Plants reproduce by means of seeds. Non-flowering plants like ferns reproduce by means of tiny structures called **spores**.

The non-living objects cannot reproduce. A chalk can be broken into several small pieces but each piece cannot grow into a new chalk piece.

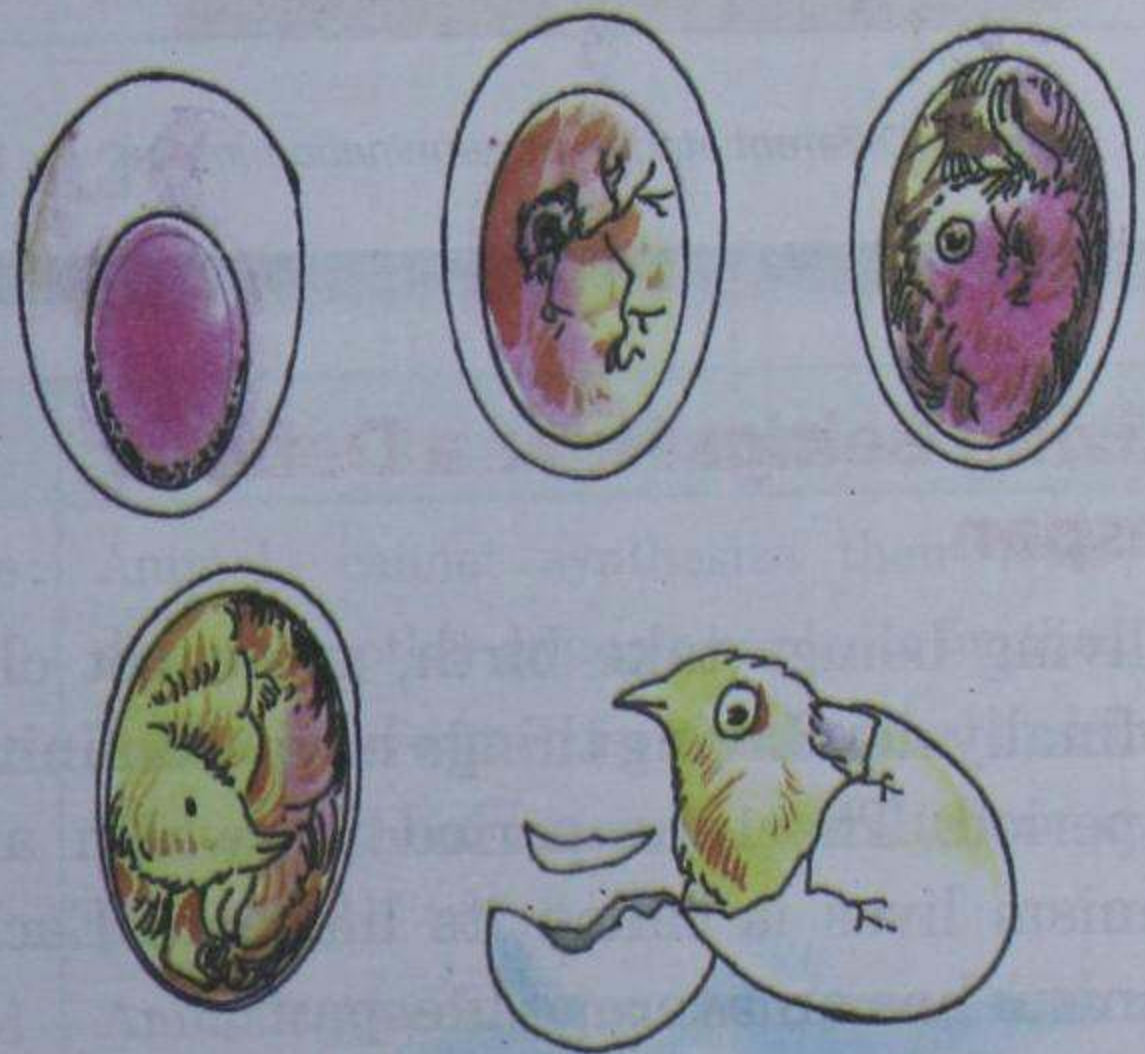


Fig. 1.8 Development of a chick from an egg

Germination of pea

Select a few seeds of good quality pea. Take a pot and fill it up with good soil. Now put these seeds at a distance from each other in the pot. Sprinkle water and keep the pot in a corner of the room from where it has access to air and light. Observe the seeds daily for nearly two to three weeks.

The pea seeds start germinating after a week. The radicle of the embryo grows first which gives rise to roots. The plumule grows next to form the shoot. The different stages in the germination of a pea seed is given in Fig.1.9.

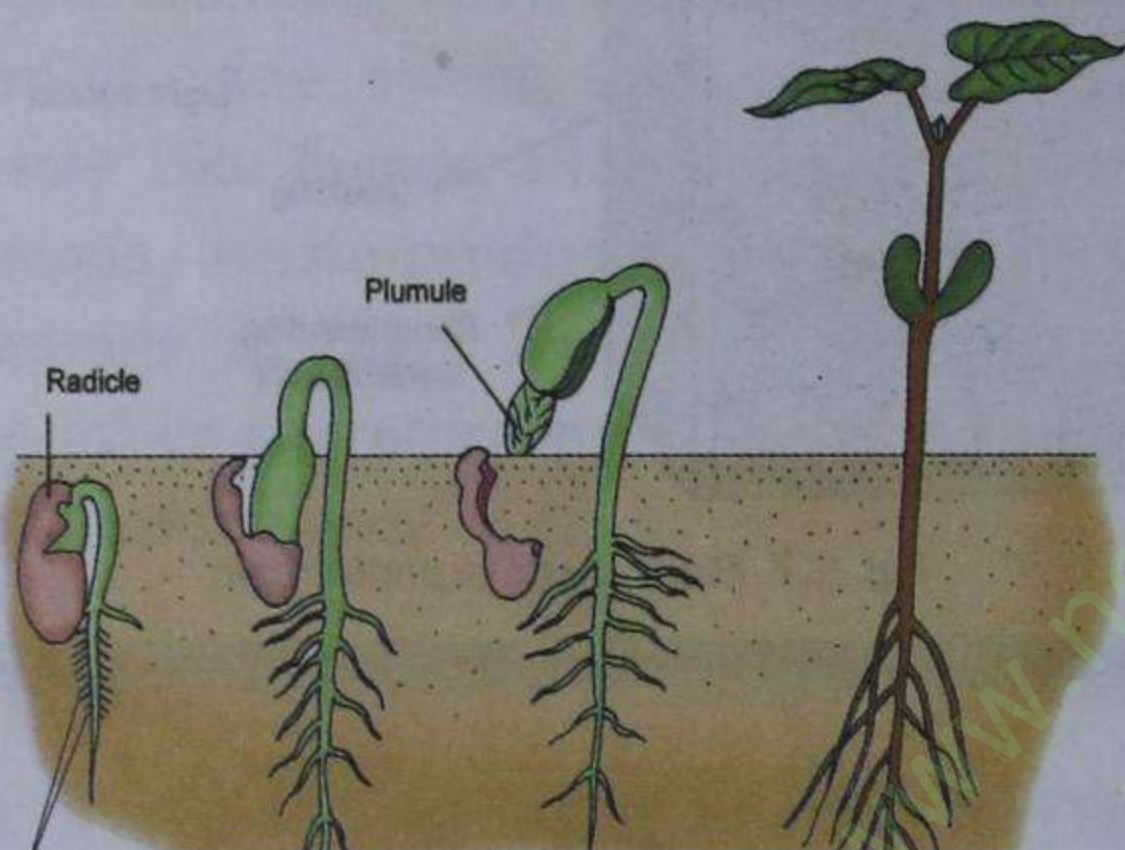


Fig. 1.9 Different stages of germination in pea

9. Living Beings Have a Definite Lifespan

All living beings take birth, grow, get old and finally die. Living things have a definite life period. The time period for which an organism lives is called its lifespan. Each organism has an average lifespan.

TABLE 1.1

Organisms and their average lifespan

Organisms	Lifespan
Housefly	1–4 months.
Mouse	2–3 years.
Sparrow	10 years.
Dog	15–18 years.
Horse	25–30 years.
Elephant	70–90 years.
Land tortoise	150–200 years.

PLANTS AND ANIMALS

Plants and animals are living organisms. They both have some common characteristics but they differ from each other in many aspects. Plants are producers whereas animals are consumers. Basic difference lies in their cellular structure.

Movement in animals is different. They move from one place to another in search of food and shelter. Plants also show movement but it is not the same kind as seen in animals. In plants stem grows towards light, roots turn towards water and soil. Sunflower changes its direction towards the sun.

Similarly, growth takes place in both plants and animals but there are some differences between them. Some of the differences in plants and animals are given below.

TABLE 1.2**Differences between living and non-living things**

	Living Things	Non-living Things
1.	Living beings are made up of cells and they have a definite shape.	They lack cellular structure.
2.	Living beings consume food to obtain energy.	Non-living things do not take in any food.
3.	Living organisms break down energy to carry out life process.	They do not respire.
4.	Growth of an organism takes place due to cell division.	Growth in a non-living object is by deposition of similar material on the body and it is external.
5.	Living beings move in search of food and shelter.	They do not move on their own. They need an external force to make them move like a motor car moves with the help of petrol.
6.	Living beings respond to stimuli.	They do not respond to any kind of stimuli.
7.	Living organisms reproduce their own kind to maintain their race.	They do not reproduce. They may only break into pieces.
8.	All living things are born, grow, reproduce and die.	There is no such life cycle present in non-living things.
9.	Living things excrete to remove waste from their body.	There is no any excretory system found in non-living object.

TABLE 1.3**Differences between plants and animals**

	Plants	Animals
1.	All green plants make their own food and the process is known as photosynthesis.	Animals cannot synthesize their food. They depend on other animals or plants for their food.
2.	Plants remain fixed and do not move.	Animals move freely in search of food and shelter.
3.	Plants grow throughout their life period.	The growth of animals is limited to certain period.
4.	Plants reproduce by producing seeds and spores.	Animals give birth to their young ones or lay eggs.
5.	Plants show response of lesser degree as they lack sense organs and nervous system.	Animals show response to greater degree as they possess nervous system and sense organs.

LET US SUMMARISE

1. Living beings are made up of cells.
2. Living beings show basic process of growth, movement, respiration, reproduction, excretion but non-living objects do not show such processes.
3. Organisms take in food. Green plants are autotrophs while animals are heterotrophs.
4. Animals respond to changes in the environment.
5. Animals reproduce their young ones.
6. Animals and plants are living organisms but there are many differences between them.
7. Basic difference between plants and animals lies in their cellular structure.

EVALUATION

Subjective Evaluation

A. Answer the following questions briefly:

1. List any two characteristics of living organisms.
2. What are autotrophs?
3. What is the meaning of growth?
4. Point out one difference in plant and animal.
5. Name a unicellular animal.
6. Name a multicellular animal.

B. Answer in detail:

1. What do you mean by responsiveness? Explain with example.
2. What do you mean by growth?
3. Why is reproduction important?
4. Differentiate between living and non-living things.
5. What is an excretory system. Name some excretory organs found in living beings.

Objective Evaluation

C. Fill in the blanks:

1. Living beings are made up of
2. Jelly like semiliquid substances present in cell is called
3. An organism made up of single cell is called
4. Removal of waste from the body is known as
5. Organisms that cannot make their own food are called as

D. Certain characteristics are given below. Sort them out for animals and plants:

(growth unlimited, locomotion, nervous system, can prepare their food, grows towards light, well developed excretory system)

Animals

Plants

1.

1.

2.

2.

3.

3.

E. Write true (T) or false (F) against the following statements:

1. Growth is unlimited in plants.
2. Animals are autotrophs.
3. Removal of waste from the body is called nutrition.
4. Amoeba is a single-celled animal.
5. Lungs and kidneys are excretory organs found in animals.