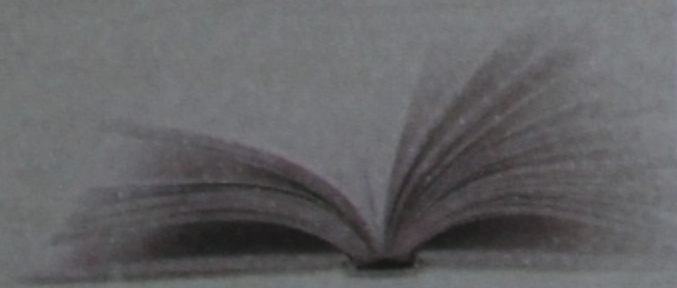




LEARNING OBJECTIVES

After completing this chapter you will be able to

- define a life process.
- distinguish between living and non-living things.
- identify and list the life processes common to all living things.
- recognise the cell as the basic unit of life.
- differentiate between unicellular and multicellular organisms.
- recognise the vast variety in the shape and size of living beings.
- differentiate between autotrophs and heterotrophs.
- recognise that all living beings reproduce to give rise to their own kinds.
- differentiate between plants and animals.



Life on Earth

You see many things around you—plants, animals, stones, soil, clothes and utensils. You also see television, radio, computers and telephones. Do all these things look alike? Do all of them show activity? The answer is 'No'. All these things look different and some of these things show activity while others do not.

If you look closely, you will notice that humans, plants and animals show activity while others do not. This is because humans, plants and animals are living beings.

Millions of plants and animals inhabit the earth. They differ in their shape, size, habits and in many other ways. An oak tree and a blade of grass are different in their form but they are both plants. An elephant and a mosquito do not look alike, but they are both animals.

Although all these look different from each other, they have some common characteristics. For example, all of them grow, take in oxygen, show movement, need nutrition, give out waste

products, reproduce and so on. These activities that organisms carry out to live are called **life processes**. Things like cycles, cars, stones and clothes do not possess such characteristics. This is why they are non-living things.

In this chapter we will learn about living beings and how they differ from non-living things.

LIVING BEINGS AND NON-LIVING THINGS

Living beings are made up of cells. They show movement and growth, take in oxygen and food, give out waste products, and give birth to young ones to continue their race. All plants and animals are living beings.

On the other hand, the things which do not show these characteristics are called **non-living things**. For example, stones, tables, chairs, cars, soil, cycles, clothes, utensils, televisions, radios, computers and telephones are all non-living things.

CHARACTERISTICS OF LIVING BEINGS

Living beings possess the following characteristics.

- ❖ They are made up of cells.
- ❖ All living beings grow.
- ❖ They need food.
- ❖ They respire.
- ❖ They move on their own.
- ❖ They throw out waste.
- ❖ They respond to stimuli.
- ❖ They give birth to young ones or reproduce.
- ❖ They have a definite lifespan.

Let us read about these characteristics in detail.

Living beings are made up of cells

All plants and animals are made up of **cells**. A cell is made up of molecules. Though these molecules do not have life, the cell is living.

ACTIVITY 1

To make a wet mount on a slide

A microscopic slide made with water is called a **wet mount**. You can practise making wet mounts by following these steps.

1. Take a clean glass slide.
2. With a dropper put a drop of water in the middle of the slide (Fig. 1.1a).
3. Gently put the object to be observed on the slide with the help of a brush or a needle.
4. With the help of a needle or a pair of forceps hold the coverslip such that it touches the edge of the drop of water. Gently lower the coverslip on the water (Fig. 1.1b).
5. Extra water may come out from under the coverslip (Fig. 1.1c). Wipe it carefully with the help of a blotting paper. Your slide is ready (Fig. 1.1d).

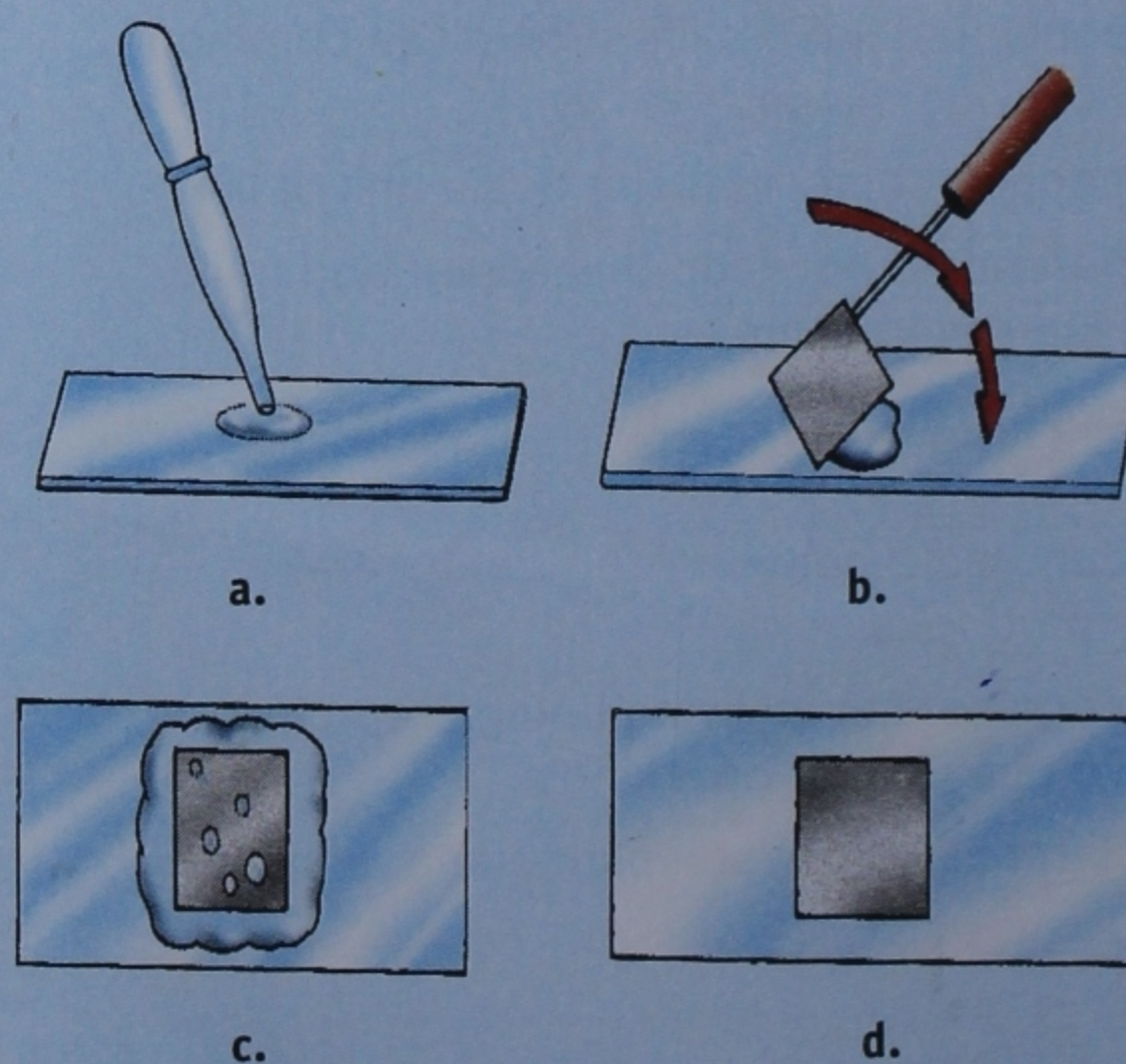


Fig. 1.1 Preparing a wet mount

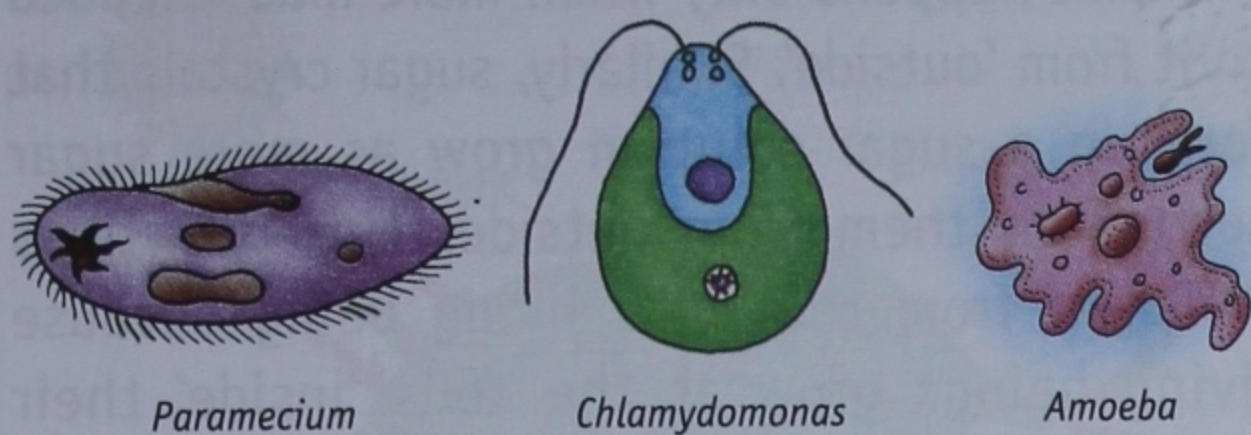


Fig. 1.2 Some unicellular organisms

All activities shown by a living being are the outcome of activities performed by the cells constituting it. Thus, **a cell is the basic structural unit of life which has life and can exist on its own.**

Some living beings like *Paramecium*, *Chlamydomonas* and *Amoeba* (Fig. 1.2) are made up of a single cell. These are called **unicellular organisms**.

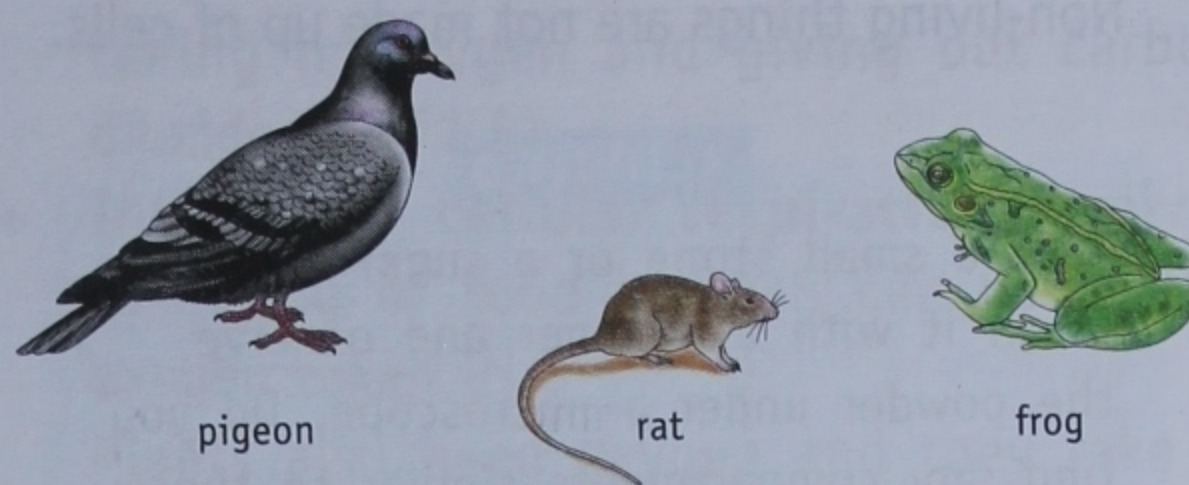


Fig. 1.3 Some multicellular organisms

Other organisms like ants, houseflies, birds, rats, frogs and rose plants (Fig. 1.3) are made up of millions of different kinds of cells. They are called **multicellular organisms**. The body of a human being may consist of trillions of cells. Human beings are multicellular organisms.

Let us try to see some plant and animal cells under the microscope.

ACTIVITY 2

To observe cells of an onion peel

Take an onion. Pull out a thin peel from the inner lining of the fleshy leaves. This is an onion peel. Prepare a wet mount of onion peel following the procedure mentioned in Activity 1 and observe under a microscope.

You will observe brick-like cells (Fig. 1.4).

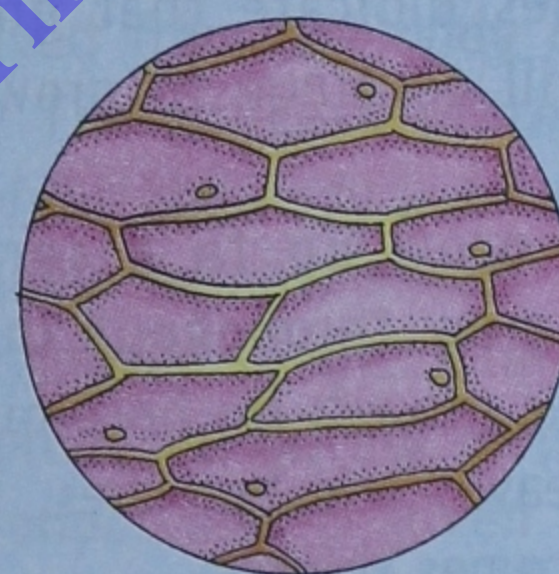


Fig. 1.4 Brick-like cells of an onion peel

ACTIVITY 3

To observe cells from the inner lining of your cheek

Gently scrape the inner lining of your cheek with the blunt end of a toothpick. Put a drop of iodine solution on a slide and transfer the scrapings onto the slide. Now make a wet mount and observe it under the microscope. You will observe flat and irregularly shaped cells (Fig. 1.5). Can you observe a distinct round part inside each cell? This is the **nucleus**.

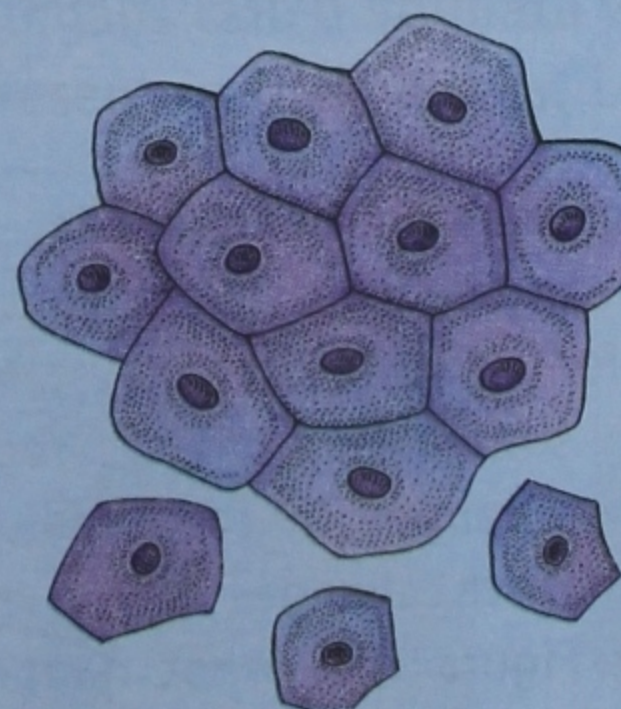


Fig. 1.5 Human cheek cells

Non-living things are not made up of cells.

ACTIVITY 4

Take a small stone or a sugar cube. Crush it with a hammer and observe the powder under a microscope. Do you find any compartments similar to those observed earlier? No cells will be seen. Thus, non-living things are not made up of cells.

Living beings grow

You have grown a lot since you were a baby. You have become tall and gained weight. Many other changes have also occurred in your body. For example, your bones have become longer, the amount of blood in your body has increased, your voice has become deeper, and your thinking power has also increased. All these changes indicate that growth has occurred. You will continue to grow up to a certain age.

All animals grow up to a certain age whereas plants grow throughout their lives. Plants show their growth by becoming taller, producing new leaves and branches. The trunk of a tree also becomes thicker.

Non-living things do not grow. Has the chair or table which you have been using for a long time increased in size? No, non-living things do not grow. A heap of mud may increase in size

but that happens only when more mud is added to it from 'outside'. Similarly, sugar crystals that form in a sugar solution grow as more sugar settles on them from outside. This growth is different from that of a living being because living beings grow as the cells 'inside' their bodies grow and multiply.

CHECK YOUR PROGRESS 1

Fill in the blanks.

1. The activities that organisms carry out to live are called _____.
2. A microscopic slide made with water is called a _____.
3. A _____ is the basic unit of life.
4. Human beings are _____ organisms.
5. Non-living things increase in size when something is added from _____.

Living beings need food

All living beings need food. They need food as a source of energy to do various activities. Food is also needed for the growth and the repair of the worn-out tissues of the body. The process of taking in food and using it for growth and other purposes is known as **nutrition**.

Depending on the mode of nutrition, organisms are divided into autotrophs and heterotrophs. Green plants are called

ACTIVITY 5

To observe growth in bean seeds

Sow a few bean seeds in moist soil. Leave them for two to three days. Make sure that the soil is kept moist. You will observe a few changes in the seeds. Compare them with changes shown in a bean seed in Figure 1.6. What happens to the size of the seedlings? Do you observe any other change?



Fig. 1.6 Germinating bean seed showing growth

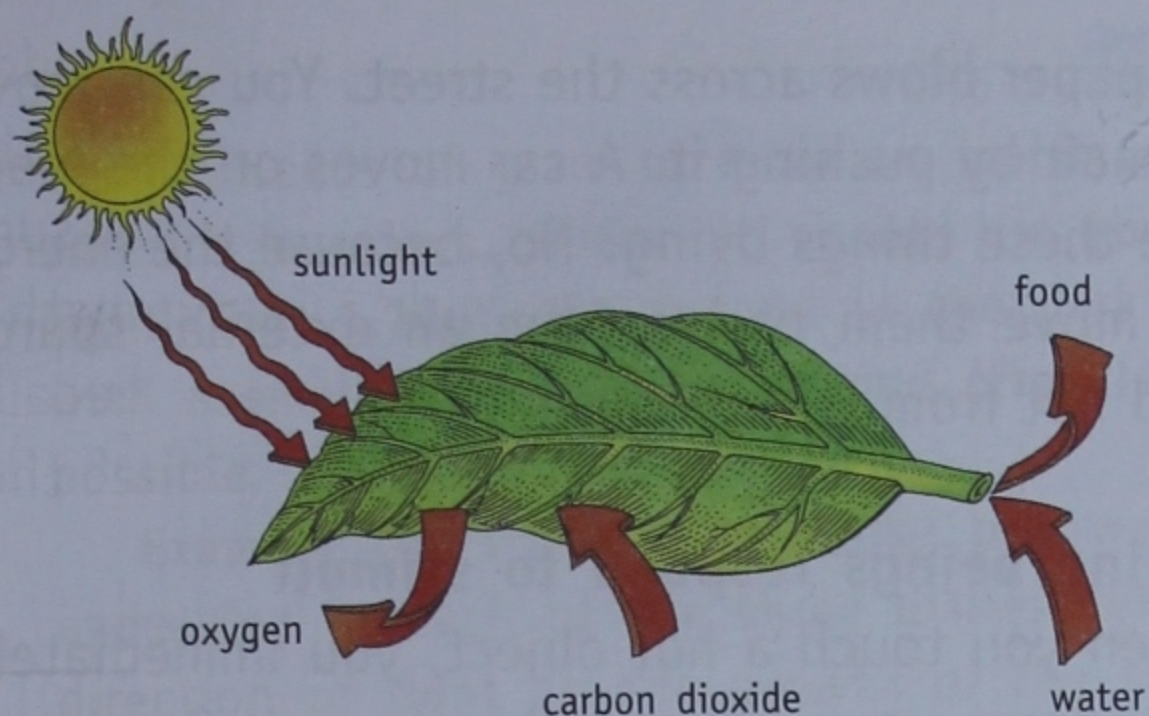


Fig. 1.7 Green plants are called autotrophs.

autotrophs as they manufacture their own food in the presence of sunlight from carbon dioxide and water with the help of chlorophyll present in their leaves (Fig. 1.7). Animals and non-green plants are called **heterotrophs** as they cannot make food on their own and depend on others for their food.

Non-living things do not need food.

Living beings respire

All living beings take in oxygen. The food consumed by an organism is broken down (oxidized) using oxygen and the energy stored in the food is released. Carbon dioxide and water vapour are produced in this process. The process of taking in oxygen, breaking down of food and releasing of carbon dioxide, water vapour and energy is known as **respiration** (Fig. 1.8).

The process of respiration has two stages.

- ❖ **External respiration** or **breathing** involves

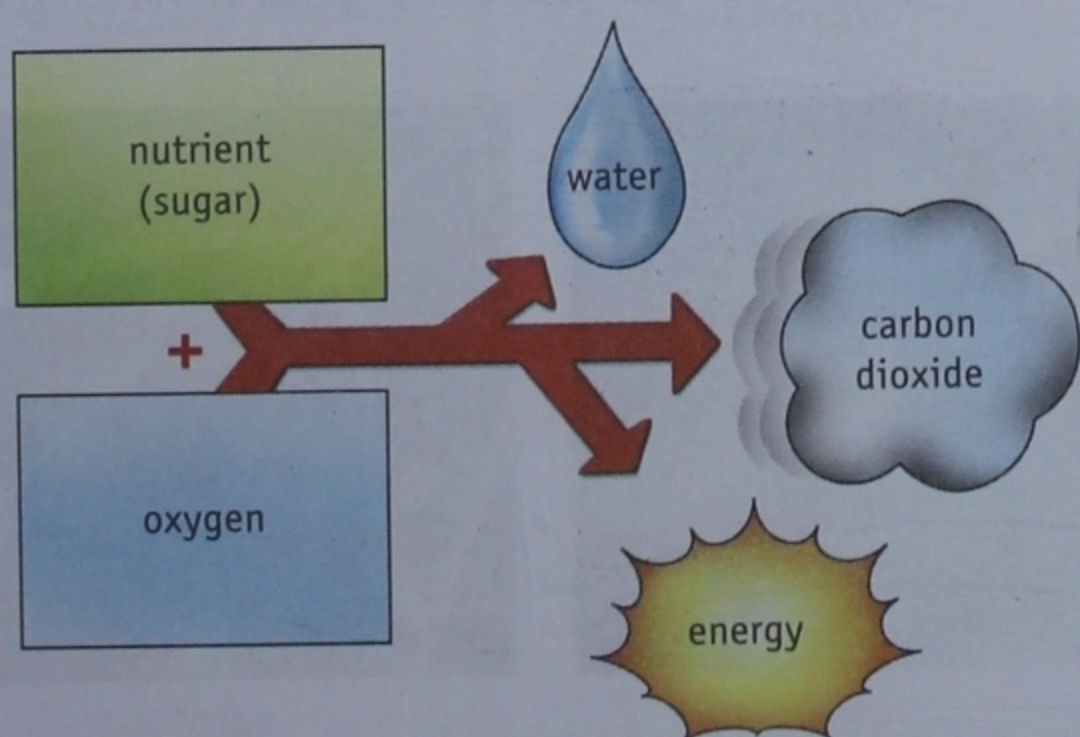


Fig. 1.8 The process of respiration

taking in oxygen and giving out carbon dioxide (Fig. 1.9).

- ❖ **Internal** or **cellular respiration** involves oxidation of food in each cell using the oxygen taken in.

Plants also need oxygen and they take it through minute pores present on their leaves and stem. Some organisms do not need oxygen for breaking down their food. They are said to perform **anaerobic** (without air) respiration.

Do you think a chair or a table takes in any foods or needs energy? Non-living things do not respire.

Living beings excrete

Waste products, like carbon dioxide and water, are produced inside the body as a result of various chemical reactions occurring inside the cells of living organisms. These substances, if not removed from the body can be extremely harmful. The process of removal of waste products from the body is called **excretion**.

In human beings, excess water along with salts is removed in the form of urine. Carbon dioxide produced during respiration is also a waste product and is given out through the lungs. Other waste matter is excreted in the form of faeces.

Plants also throw out waste, mainly gases and water vapour. They throw out gases through special organs called **stomata** which are minute pores present in their leaves. Leaves store solid

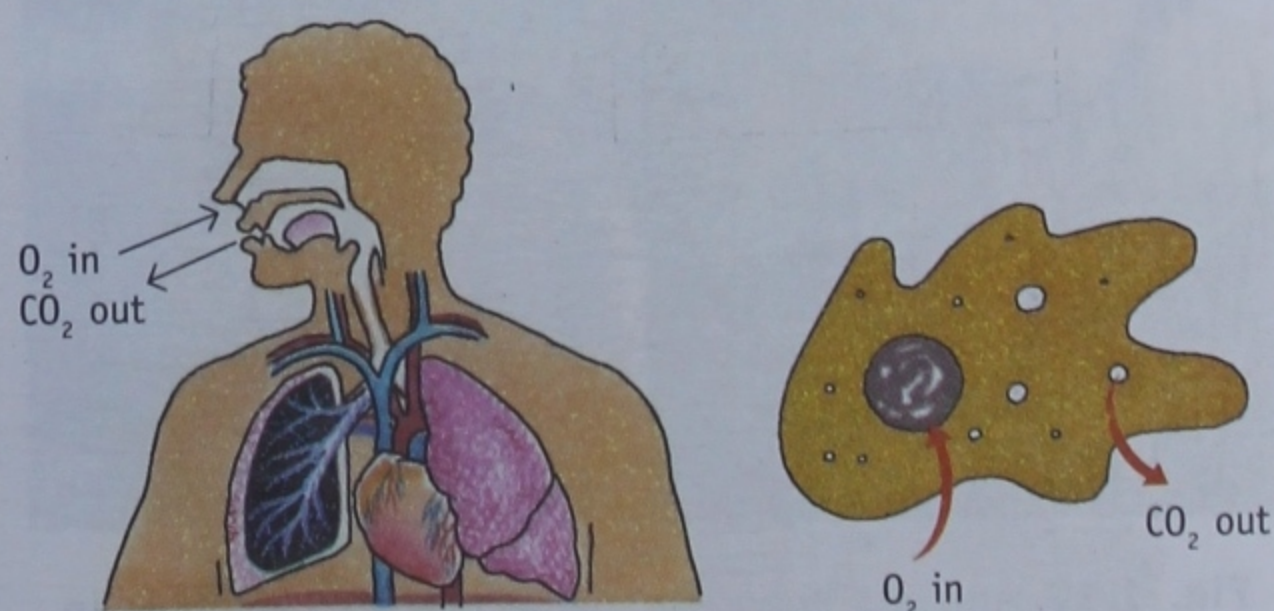


Fig. 1.9 All living beings need oxygen.

waste in the leaves and the bark. When they shed their leaves and bark, the waste products stored in them are also thrown out.

In some plants, the waste products are converted into harmless substances like gums and resins.

Living beings move

Animals like birds, insects and houseflies move from one place to another in search of food, shelter and to protect themselves from their enemies (Fig. 1.10). The movement from one place to another is called **locomotion**. Animals have special organs for locomotion. For example, fishes have fins, birds and butterflies have wings and so on. The energy to move comes from within the living being. Animals also move different parts of their body.

Plants also show movement. The stem grows towards light, the roots grow and turn towards water and soil. Flowers of the sunflower plant change their position to face the sun. Similarly, the tendrils of climbers twine around supports and the leaves and petals of some plants close during the night and reopen in the morning. If you touch the leaves of a sensitive plant such as the touch-me-not (*Mimosa*) plant, they droop (Fig. 1.11). Plants do not show locomotion.

Do non-living things move? Clouds move across the sky. Water flows in a river. A piece

of paper blows across the street. You can move a chair by pushing it. A car moves on the road. Are these things living? No, because the energy to move them comes from an external source and not from within them.

Living beings respond to stimuli

When you touch a hot object, you immediately withdraw your hand. Why does it happen? Any change in the external or internal environment of an organism which produces a reaction is called a **stimulus**. Withdrawing your hand on touching a hot object is a **reaction** or **response**. All living organisms respond to stimuli. Plants also respond to stimuli. One very good example of a plant responding to touch is the 'touch-me-not' plant. The leaflets of this plant droop as soon as they are touched.

Have you ever seen a stone responding to a stimulus? Non-living things do not respond to any kind of stimuli.

Living beings have a definite lifespan

All organisms follow a life cycle. They are born, they grow, reproduce and they die. Different organisms have different lifespan (Table 1.1). The **lifespan** of an organism is the time between its birth and death. Some plants like wheat and maize live only for one season whereas rose, *Bougainvillea* and trees like *peepal* and banyan live for several years. The giant



Fig. 1.10 Animals move from one place to another in search of food, shelter and to protect themselves.



Fig. 1.11 If you touch the leaves of *Mimosa* plant, they show movement by drooping.

ACTIVITY 6

Keep 5 seeds of gram or bean on moist cotton wool in three separate dishes a, b and c. After a few days, when the shoots are about half an inch long, keep one dish in the light (Fig. 1.12a), the second in the dark (in a box) (Fig. 1.12b) and the third in a box with a small hole cut in one side (Fig. 1.12c). Keep them all moist, and as far as possible, equally warm.

Examine the three dishes after one week. Give a brief description of the shoots appearing in each of the three dishes. What has been the effect of light and the direction of light on the growth of the shoots?

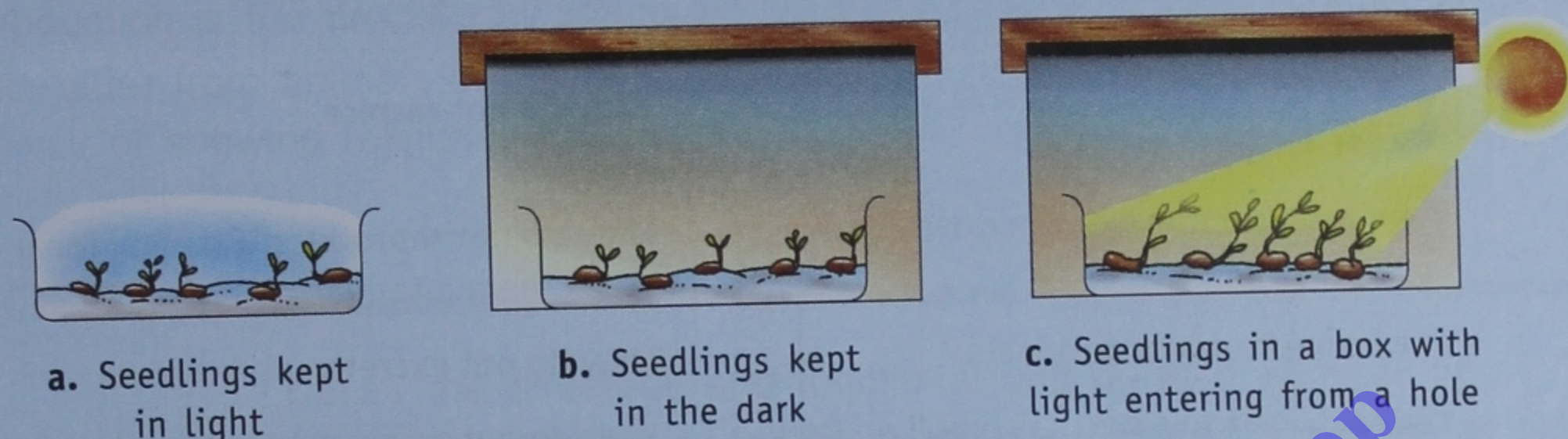


Fig. 1.12 Plants respond to light.

redwood trees in California have been growing for over 2000 years.

Living beings reproduce

Living beings produce their own kind

Table 1.1 Average lifespan of some organisms

ORGANISMS	LIFESPAN (approx.)
bacteria	20 minutes
mayfly	24 hours
housefly	20–30 days
beetle	3–4 months
mouse	2–3 years
parakeet	10–15 years
dog	12–15 years
lion	25 years
humans	60–80 years
elephant	50–60 years
tortoise	150–200 years
banyan tree	200 years

(Fig. 1.13). Dogs give birth to puppies, lions give birth to cubs, human beings give birth to babies, birds lay eggs to produce chicks and plants produce seeds from which seedlings come out. In some plants, new plants grow from different parts of the parent plants. For example, when the roots of the sweet potato are planted in the soil, new plants are produced.

Does a stone produce more of its own kind? Can a pin produce more pins? Non-living things do not reproduce.

The differences between living and non-living things are summarized in Table 1.2.

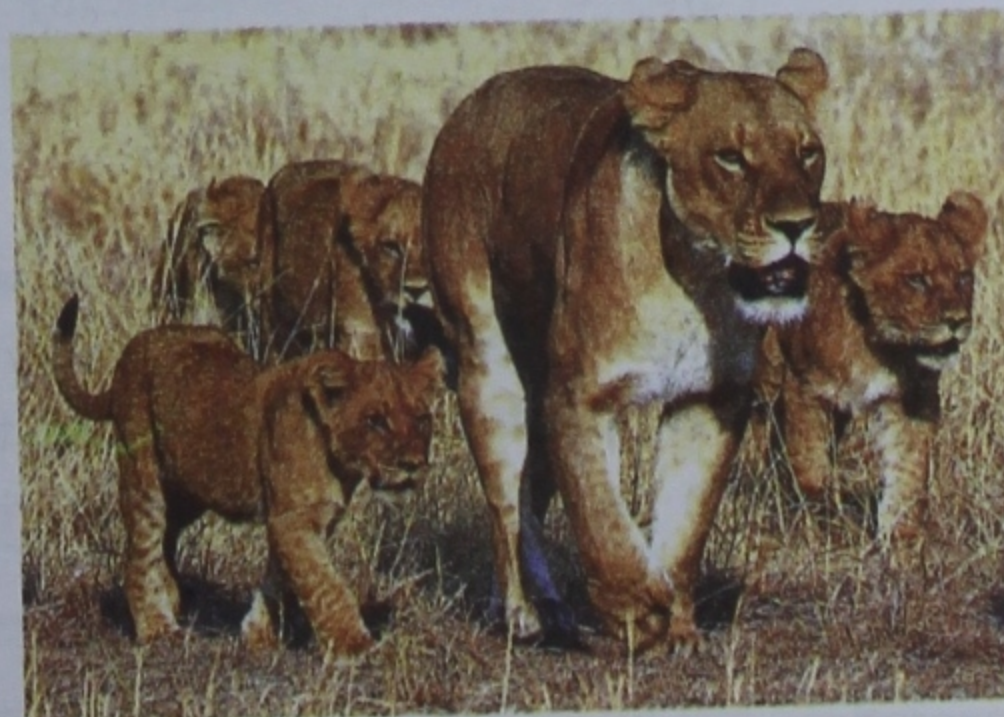


Fig. 1.13 Living beings reproduce.

Table 1.2 Differences between living beings and non-living things

PARAMETER	LIVING BEINGS	NON-LIVING THINGS
Structure	They are made up of cells.	They are not made up of cells.
Growth	They grow by multiplication of cells internally. It is not reversible.	They grow when more material of similar kind is added from outside. It is reversible.
Movement	They show movement and the energy to move comes from within.	They do not move on their own. They show movement only when external force is applied.
Nutrition	They need food to grow, repair their body and carry out various life processes.	They do not need food.
Respiration	They need oxygen to break down food to release energy.	They do not respire.
Reproduction	They produce more of their own kind.	They do not reproduce. External force can break them into many pieces.
Excretion	They excrete waste products.	They do not excrete.
Responsiveness	They respond to external stimuli on their own.	They do not respond to external stimuli on their own.

PLANTS AND ANIMALS DIFFER

In spite of having some common similarities,

plants and animals differ from each other in many ways. Some of these are given in Table 1.3.

Table 1.3 Differences between animals and plants

PARAMETER	ANIMALS	PLANTS
Nutrition	Animals cannot make their own food. They depend on plants or other animals for food. Thus, animals are heterotrophs.	Green plants make their own food using carbon dioxide and water in the presence of sunlight and chlorophyll. Thus, plants are autotrophs.
Movement	They move from one place to another.	They are fixed and do not move, though their parts may show movements.
Response to stimuli	They show quick response to external stimuli because they have sense organs.	They show slow response to external stimuli because they have no sense organs.
Growth	They stop growing when they reach their adult size.	Most of them grow throughout their life.

Now you know

- ▶ Things that are made up of cells, show movement and growth, take in oxygen, need nutrition, give out waste products and give birth to young ones of their own kind are called living beings.
- ▶ Things which do not possess characteristics of living beings are called non-living things.
- ▶ All living beings are made up of cells.
- ▶ The basic life processes carried out by all living organisms are growth, respiration, movement, excretion, nutrition, response to stimuli, and reproduction.

- ▶ The process by which living organisms obtain and use food is known as nutrition. Green plants are autotrophs and animals and non-green plants are heterotrophs.
- ▶ Growth results from an increase in the number of cells in multicellular organisms. In unicellular organisms like *Amoeba*, growth results from an increase in the size of the single cell.
- ▶ Internal respiration involves oxidation (burning) of food to release carbon dioxide, water and energy.
- ▶ Animals move from one place to another whereas plants remain fixed to one place.
- ▶ A stimulus is a change in the environment to which an organism responds. All living beings respond to stimuli.
- ▶ Reproduction is the process by which an organism produces more organisms of the same kind.
- ▶ Plants differ from animals in the processes of nutrition, movement, reproduction and growth. The way of showing response to a stimuli in plants and animals is also different.

Keywords

CELL	the structural and functional unit of an organism
NUTRITION	the process of taking in food and breaking it down to release energy
STIMULUS	something causing or regarded as causing a response

Exercises

A. Tick the most appropriate answer.

1. The body of a unicellular organism is made up of
 - a. only one cell.
 - b. no cell.
 - c. many cells.
 - d. none of these
2. The average lifespan of humans is
 - a. 60–80 years.
 - b. 20–30 days.
 - c. 100–150 years.
 - d. none of these
3. During respiration in humans, carbon dioxide is excreted through the
 - a. lungs.
 - b. brain.
 - c. kidneys.
 - d. heart.
4. Green plants are
 - a. unicellular.
 - b. autotrophs.
 - c. heterotrophs.
 - d. none of these
5. Reproduction is the characteristic feature of
 - a. plants only.
 - b. animals only.
 - c. all living beings.
 - d. non-living things.

B. Fill in the blanks.

1. The body of a living organism is made up of _____
2. Animals depend on plants for their food and are called _____
3. Most _____ grow throughout their lives.

4. Living beings respond to _____
5. The lifespan of an organism is the time between its _____ and _____
6. _____ is needed for oxidation of food in cells.
7. On oxidation, food produces _____, _____ and _____
8. The movement from one place to another is called _____
9. In human beings, excess water along with salts is removed in the form of _____
10. Removal of waste from the body of a living organism is known as _____

C. Match the terms with their meanings.

- | | |
|-------------------------|---|
| 1. reproduction | a. any change in environment |
| 2. excretion | b. producing more of their own kind |
| 3. stimulus | c. removing waste from the body |
| 4. life processes | d. taking in oxygen and giving out carbon dioxide |
| 5. external respiration | e. activities that sustain life |

D. Sort out the terms given in the list into the groups ONLY ANIMALS, ONLY PLANTS and BOTH ANIMALS AND PLANTS.

excretion

respiration

photosynthesis

eating other living things

movement from place to place

growth towards light

growth throughout life

growth stops when adult size is reached

ONLY ANIMALS

ONLY PLANTS

BOTH ANIMALS AND PLANTS

E. Write short answers.

1. List two characteristic features of all living organisms.
2. Name three unicellular animals.
3. How does growth in unicellular organisms differ from growth in multicellular organisms?
4. How do plants get rid of their solid wastes?
5. How is the movement of a non-living thing different from that of a living being?

F. Answer in detail.

1. What are autotrophs? How do they differ from heterotrophs?
2. What is the difference between respiration and breathing?
3. What is an anaerobic respiration?
4. Why do living organisms move from one place to another?

5. Differentiate between plants and animals.
6. You are travelling in a car with all the windows closed in winter. After a while you notice a mist forming on the windows. This mist is made up of tiny droplets of water. Where did they come from?

Fun to do

1. You can make a simple microscope with a key. Dip a part of the key with the hole into a glass of water. Make sure that the drop of water stays in the hole. Look through the drop of water to read the small print in a book. Move the key up and down very slowly. What happens?



2. Visit a field of fully grown sunflower plants. Note the direction in which the flower faces at every two hours interval. Do you notice any change in the direction of the sunflower at every interval? Can you correlate it with the movement of the sun?