16

Living and Non-Living

The seeds of an Indian Lotus plant remain viable for 300 to 400 years.

Venkatesh likes his blue shirt which he bought in the previous year. Now it does not fit him. He wants to alter it. He went to a nearby tailor shop along with his friend Tanvir. The tailor refused to alter the shirt because he said that it is not possible to increase the size of a shirt. On the way back, the friends saw a dog lying on the roadside as if it was fast asleep. Venkatesh wondered whether the dog was alive. "It is quite obvious that the dog is alive, Its stomach is telling us that it is alive. Look at it carefully." said Tanvir.

- Why do you think Venkatesh's favourite blue shirt does not fit him now?
- How will you decide whether the dog is alive or not?
- Can you decide whether a plant is alive or not by using the same reason?

There are many things around us; different types of plants, table, chair, soil, rock clothes, different animals, insects, birds. We can categorize them in various groups. Members of a common group share some common characteristics. In the previous chapter, we categorized materials as solids, liquids and gases. Another type of category is that of living things and non living things.

- Do all living things share some common characteristics?
- What are these characteristics?
- To be a part of living group is it necessary to bear all the characteristics of living things?

Activity-1: Living things - Non living things.

List out as many living things as you can. Don't forget to give reasons for why you think something is living.

Chair and tables also have four legs like buffalo. But they can't move, why? Trees cannot move but they can produce seeds which give birth to new plants. How do we know whether some things are living and some others are non-living? You will notice that there are many characteristics of living things. Do all living things have common characteristics that make them different from nonliving things?

- Do you know you are a living being? How can you say that?

Activity-2: Compare the characteristics

Some characteristics that are listed in Table-1 tells you that you are a living being. Compare these characteristics with plants, animals and rocks.

Table 1

S. No.	Characteristics	In you	In plants	In animals	In rocks
1	Growth	⊨	⊨	⊨	×
2	Movement				
3	Taking Food				
4	Breathing				
5	Getting rid of waste				
6	Respond to Heat				
7	Respond to touch				

8 Respond to light

9 Giving birth to young ones

- Do plants and animals possess the same characteristics as you do?
- In which way do the characteristics of plants differ from you or from other animals?
- What characteristics are same in plants and animals?
- Do you agree that you are the same as other animals?
- What characteristics do you observe in rocks?

The things around us that possess the characteristics listed above are known as living things. Those which do not possess these characteristics are known as non-living things.

Some of the characteristics are common in all living things. Can we say all characteristics listed in activity 2 apply to all living beings?

You know that plants are also living beings like us. Plants grow like we do but do they move like us?

Is it essential for a living thing to have all of these properties or could a thing be considered living if it has some of these properties? Let's take a closer look at the characteristics of living things.

Movement in living beings

- How do the following living beings go from one place to another? Observe the following table discuss in groups and write the way the organisms move.

Table 2

Living organism	Means of motion
Myself	walk, run, ...
Housefly	
Grasshopper	
Frog	
Snake	crawls, ...
Birds	
Fish	
Plant	

Do you have more examples of different kinds of movements in animals? List them in your notebook.

- We see that plants don't move like us. Should we consider them as living beings?

There are some movements in plants for example, closing and opening of flowers. Discuss in groups. List out the movements in plants. Track your discussions in your notebook.

- We say that plants don't move but we find plants of the same types in different locations. How is this possible?
- Other than plantation by human beings there are many natural ways of seed dispersion. The seeds grow into plants and we feel that plants have moved from one place to another. Can you list these natural ways of seed dispersal? We will learn more about this in the next class.

Food and living beings

We have seen in the chapters on food that we as well as all other animals need food for smooth functioning of different activities.

- Do plants also need food?

In the chapter "plants parts and functions", we have seen that some parts of plants like root, stem and fruits store food.

- What are the sources of their food?

Most of the plants absorb water and minerals from the soil and prepare their food in the presence of sunlight. The leaf is the place where the food is prepared.

Do you know?

We also prepare food. Is our process of preparing food the same as that of the plants? By using carbon dioxide, green colour substance in the leaves and sunlight plants prepare their own food. This is called photosynthesis.

Growth in living beings

You notice that kittens, pups and chicks grow into adults. You become taller every year. Similarly, a seed germinates into a plant. Some plants grow day by day into trees. A human child grows into man/woman. Plants also produce branches that show their growth. They grow throughout their life but we don't grow like that. We will grow upto certain age and height. But some parts of the body grow throughout our life. Think what those parts are? (Fig. 2(a) and 2(b)).

Fig. 2(a)

Activity-3: Grow - Doesn't Grow

You listed several living things in activity 1. How do they grow? Analyze your observations. Also add some things that don't grow. Record in table 4.

Fig. 2(b)

Table 3

Grows for a hen, ... **certain period**	
Grows throughout its life	
Doesn't Grow rock, ...	

- Do all living things grow throughout life?
- Pick up any item from the column 'doesn't grow' in the above. Does it need food?
- Do you grow for life time or not why?

If we grew like trees, how would we look like? It's funny to think. Have you read stories of Lilliputs, David and Goliath?

Non-living things cannot grow. Growth is also a characteristic feature of living things. Is it common to all living things?

Do all living things breath

Observe the abdomen of a cow when it is in rest position. How is it? It moves slowly. This shows that the cow is breathing. If you keep a finger in front of your nose, you feel air coming out of your nostrils. When we breathe in or inhale, air moves from outside to inside our body. When we breathe out or exhale the air inside comes out.

- Do all birds have noses? How do they breathe?
- Fish can't remain alive in air. How might they breathe while remaining in water?

Do all living things breathe? Do plants breathe like us? We know that they don't have a nose. How would they breathe? Let us try to understand.

Activity-4: Plant has nose

Take any fleshy leaf like, alovera. Peel from it and put it on a slide. Observe this under a microscope. You will see the structures as shown in Fig. 3. They are called stomata. These are useful for exchange of gases.

Fig 3 (a) Fig 3 (b) stomata

Do all living things get rid of their waste?

We know that all living things take in food. After digestion, wastes have to be removed from the body. Our body produces different types of waste materials during different life processes. When we work hard our body becomes wet with sweat. This is a waste material. The process of getting rid of wastes is called **excretion**. In what forms do animals excrete? Animals excrete wastes in different forms - dung, urine, sweat etc. Plants also excrete their wastes but this is not in the same way as animals. Have you ever observed sticky substance on the stems of trees?

Actually this gummy substance are the excretions. Generally we feel that excretions are useless and foul smelling material. But excretory products of animals are used as manure. Secretions of plants like, gums and resins, are also useful for us.

Living things give birth to young ones

Activity-5: Egg or Baby

Make a group with 4 or 5 students. List out birds and animals from your surrounding. How do they produce their young ones? Write in table-4 whether they lay eggs or they give birth to young ones.

Write the table in your note book and Extend the list.

Table 4

Animals/ birds that lay eggs	Those which give birth to young ones

Fig 4(c)

Birds and animals that lay eggs for giving birth to young one are known as **oviparous**. (Fig-4(b)) Those which give birth to young ones without laying eggs are known as **viviparous**. (Fig-4(c))

• Can plants be classified as Oviparous or Viviparous?

We know that seed germinates into plants. This means that plants also produce their young ones. Seed germination is one of the ways of doing this.

• Are there any other ways in which plants produce their young ones?

Response to stimulus

Activity-6 : What will happen

When you step on a sharp object what would you do? You will take back your feet. Is not it? Discuss with your friend how would we respond in the conditions given in table-5.

Table 5

Stimulus	Response
When you step on a sharp object	
Touch a flame or fire	
Touch ice-cream	
See a bright light	Blink, ...
Get bitten by an ant or mosquito	
When you hear the word ‘tamarind’	Mouth waters, ...

All living beings possess the characteristic feature of response to stimulus.

• Do other animals also respond to stimuli like us?

• Do plants respond to stimuli like animals?

Activity-7 : Atti-Patti

It is very interesting to observe a touch me not (Atti-patti or mimosa)plant. Touch it. Record your observations. How does this plant respond when you touch it? How much time does it take to return to its previous position?

This observation explains that plants also respond to stimulus. Some plants bloom in the morning and some at night. These respond to sunlight. When winter comes many trees shed their leaves. They respond to change in temperature.

Activity-8: Response to light by earthworms

Get an earthworm from nearby, moist soil. Take a glass jar. Cover half of the glass jar with black paper as shown in Fig. 6. Put some soil in the jar and put the earthworm in the jar. Close the jar with a lid that contains small holes, to allow air into the jar. When earthworm crawls out of the covered portion, shed some light on the jar. What happens?

Fig. 6

When we shed light on the earthworm, it moves to the dark portion. It seems that earthworms show response to stimulus, in this case light.

Seeds - Living or not

Seeds are produced from plants. We know that plant is a living being. Can we say that seeds are also living? Let us discuss what characteristics of living beings seeds have?

- Does a seed take in food? From where?
- Will it die if stored for a long time?
- What happens when a seed is sown in soil?

Seeds germinate and turn into a whole plant. So we can say that seed is a living thing. Can you think of any way of deciding whether dry seeds are living? (Fig-(6a))

Venkatesh noticed that growth, breathing, excretion, taking food, giving birth to young ones, response to stimulus, movement are some of the characteristics of living beings. He also observed that these are not common among all living organisms.

But, non-living things do not possess these characters. He observed that people depend upon both living and non-living things. Generally we are told that the plant is dead when it has dry leaves and stem. If an animal doesn't show living characteristics, we can say that the animal is dead. Is a dead plant or a dead animal non-living?

Dead plants, animals or any other living beings decompose to form non-living constituents. So we can't say dead things are non-living things. They are intermediate things between living and non-living things.

Living things under a microscope

The letters in a book are quiet small. What do old people do to read books? Children frequently play with magnifying lens. When we see objects through magnifying lens they seem to be bigger than their actual size.

Activity-9 : Prepare your own magnifier

Collect an used electric bulb. Remove its filament. Fill water in half of the bulb. See a book through this bulb. Do the letters in the book seem bigger?

Are all things around us visible to us? Name some small animals that you see. Can we see mouth and antenna of ants and small insects with our naked eye? When you touch flowers, a yellow colour powder sticks your fingers. If you want to know what it is, what can you do?

We cannot see all things around us with our naked eye. Because those things like antenna of ants, yellow powder of flowers are very small. In the living world there are some things that are not visible. We cannot see them. We can see those small organisms under a microscope. Living beings that we can see only under the microscope are called micro-organisms. Let us try to understand about a microscope and then use it for observing some micro-organisms.

What is a microscope?

Microscope is an instrument with the help of which we are able to see minute things that we cannot see with our eyes. It works like a hand or magnifying lens but it is much more powerful.

Basically, there are two components in a microscope - the structural component and the visual components

Structural components are the head/body, base and arm. Visual components are eyepiece, objective, nosepiece, coarse and fine adjustment knobs, stage, aperture etc.

Fig. 8 shows a labeled diagram of a compound microscope. Taking its help identify different parts of microscope in your school.

Now we want to see some micro-organism. Where can we find them?

Activity-10: Bread Mould

Generally our elder say that we should not put wet spoons in pickle jars. Why do they say this? When you put wet spoons in a pickle jar, the pickle will spoil. What happens when you pack bread or vegetable and keep for a couple of days? You observe that they become rotten and emits a foul smell. We can see thin, thread like grey colour substance. After some days this grey colour substance turns black. If you touch this material black colour substance sticks to your fingers.

Fig. 9

Collect this rotten material and observe it under a microscope. Note your observation and discuss with your friends. Draw the structures seen by you under the microscope.

These tiny thread like structure are commonly called mould. Can we say that mould is also living?

The mould that develops on spoiled material is able to produce new mould. It grows. So we can say the mould is also living.

We all know that cows gives us milk. So they are useful. Do micro-organisms help us in any way?

- Why is idly mixture prepared the day before?
- Why do we add little amount of butter milk to milk to get curd?

Activity-11: Let us see microscopic organisms

Take the watery substance in curd. Put a drop of this substance on a glass slide. Cover it gently with another slide. Observe this under a microscope. Note your observations. Draw a picture of what you see under the microscope.

The micro-organisms that you see under the microscope are called bacteria. Bacteria are in different shapes. The bacterium that you see in curd is helpful. This bacteria named lactobacillus helps to convert milk into curd.

Are bacteria harmful?

Discuss with your teacher how bacteria are harmful. Some bacteria cause diseases in human beings as well as animals and birds. These bacteria spread from one person to the other and cause various types of diseases. They spread all over the world. There is no place in the world without bacteria.

When you suffer from a disease, the doctor advises you to take boiled water. Are there micro-organisms in water? Is the water that you drink regularly, pure?

Activity-12: Micro organisms in water

Collect water samples from a pond, well, bore well. Keep them separately. Put a drop of water on a slide. Keep another slide on it. Observe under microscope. What type of micro-organisms do you see in water samples? Do all water samples have the same type of micro-organisms? Is there any water without micro-organisms? Which water contains larger number of micro-organisms? Draw what you have observed. Describe the shapes of the micro-organisms.

- Which water contains larger number of micro-organisms? Why?
- What difference do you find in the appearance of micro-organisms in pond water and bore well water?

Thus we see that micro-organisms are present everywhere, although they are not visible to naked eyes. From our activities, we could see only a few of them. But there is a vast world of micro-organisms and they are all part of the living world.

Keywords

Living things, non-living things, growth, breathing, excretion, response, stimulus, movement, micro-organisms, microscope

What we have learnt

- There are living and non-living things around us.
- When living things lose their life they become dead.
- Dead is an intermediate stage between living and non-living things.
- Dead material decomposes to form non-living things.
- Living things possess characteristics like growth, breathing, excretion, movement, response to stimulus and giving birth to young ones.
- Among living things, plants and trees can't move like animals.
- Seed is also a living thing but it doesn't have all characteristics of the living world.
- We can see minute things under a microscope.

Improve your learning

1. List out common characteristics of living things.
2. Why do cockroaches come out of their places when lights are put out?
3. Which characteristics are same in both living and non-living things?
4. Which of the following are derived from living things : sugar, coconut oil, pen, rice, fan, omelet, bus, wooden chair, garland, mango, clothes, fruit juice.
5. How can you say that a tree is living even though it doesn't move?
6. What is the use of microscope?
7. Thread like structure developed in bread are ----------
8. Which of the following is not a response to stimulus :

a) Feeling cold by touching ice.

b) Feeling the weight of carrying a bag of books.

c) Scratching the skin at the place of ant bite.

d) Closing eyes immediately after seeing bright light.

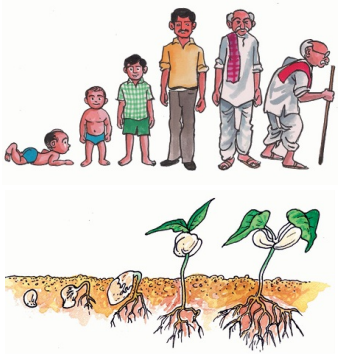
9. Collect sweet potato, bottle, salt, and water. Take a bottle full of water and add salt, then put the sweet potato inside the bottle. Observe for a few days. What happens? Note your observations. How can you prove that sweet potato is also a living thing?
10. Venkatesh argues with his friend Tanveer about "seed is living" Think. What questions does Tanveer ask?
11. What will happen if there is no stomata in leaves? Write your predictions.
12. Write down the steps of the experiment that you did in the lab to observe micro-organisms in pond water.
13. How do you feel when you touch 'Touch me not' plant? Write your feelings.
14. Prepare Venn diagram to represent living non living characters of dog and tree.
15. Do you think both living and non living things are necessary for our environment. Why?
16. Collect information from your school library / internet about Sir J.C. Bose who invented response to stimulus in plants.

Fig 1

A new born blue whale measures 20-26 feet (6.0 - 7.9 meters) long and weighs up to 6,614 pounds (3003 kg).

The longest living cells in the body are brain cells which can live an entire lifetime.

The average cough comes out of your mouth at 60 miles (96.5 km) per hour.



An egg white is made mainly of a protein called albumen.

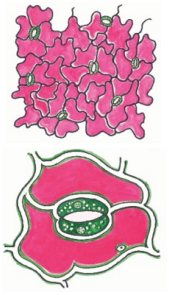


Fig. 4(b)

The leg muscles of a locust are about 1000 times more powerful than an equal weight of human muscle.

Fig 4(a)

The Atlantic Giant Squid’s eye can be as large as 15.75 inches (40 centimeters) wide.

Fig 5

The average human brain has about 10 billion nerve cells.

Fig. 6(a)

The human heart creates enough pressure to squirt blood 30 feet (9 m).

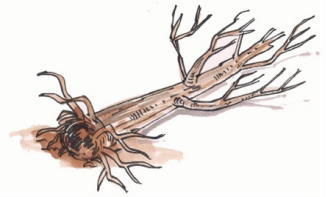
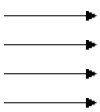


Fig. 7

Bacteria are found everywhere - in air, water, soil, animals, people and food.

Arm
Base

Coarse Focus
Fine Focus



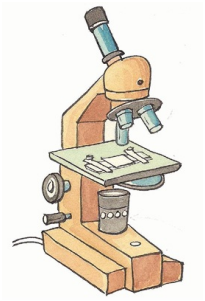
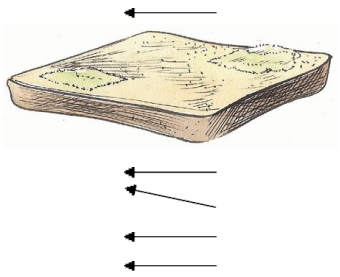


Fig 8



Eye Piece

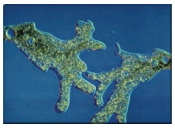
Light
Slide

Objective Lens

Stage

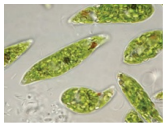
Some moulds are used in food production such as cheese manufacture.

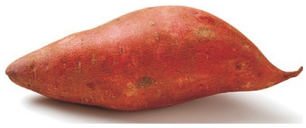
Fig. 10



In humans the compound used to transport of oxygen in respiration is known by the name haemoglobin.

Fig. 11





The brain operates on the same amount of power as 10-watt light bulb.