

# UNIT 2

## MICROORGANISMS



### In this unit, we will learn:

- Virus, bacteria and fungi
- Usefulness and harmfulness of microorganisms

We see living things all around us. Animals and plants are the well known examples of living things. However, there are some groups of living things that we cannot see with our naked eyes. These are the microorganisms. The word "microorganism" is the combination of two words, 'micro' means very small and 'organism' means living thing. In this unit, we shall discuss the microorganisms.

### 2.1 Microorganisms

Microorganisms are the living things that we cannot see with naked eye (Figure 2.1). They can only be seen with the help of a microscope. Microscope is a special type of instrument used for producing a much larger view of very small objects so that they can be seen clearly.

Microorganisms may be single-celled or may have more than one cell. They are widely distributed in the environment and are found in the air, soil, dust, foods, etc.

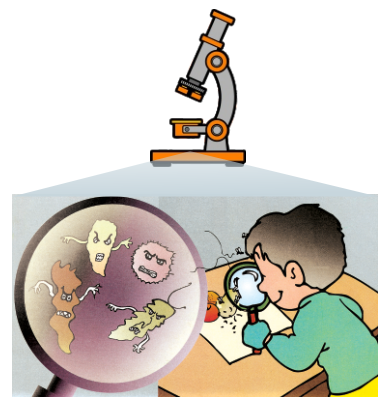


Figure 2.1

### Interesting information

- Microorganisms or microbes are the oldest form of life on the Earth. Some types have existed for billions of years.

## 2.2 Main Groups of Microorganisms

### (Virus, Bacteria and Fungi)

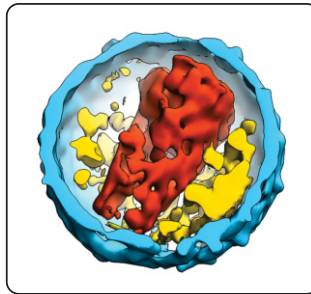
There are many different kinds of microorganisms. They are classified on the basis of shape, structure, feeding habit, etc. Main groups of microorganisms are viruses, bacteria and fungi.

### Viruses

Viruses are the smallest of all microorganisms (Figure 2.2). The word virus means poison. They are always harmful for living things as they cause diseases in humans, animals, plants and other organisms.



Polio caused by virus



Shape of virus

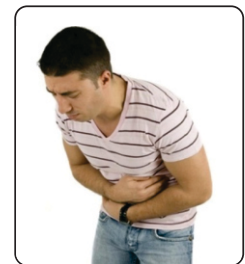


Flu caused by virus

Figure 2.2 Some viruses

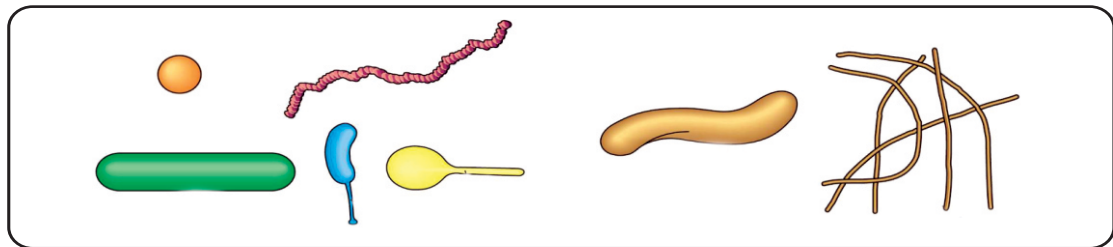
### Bacteria

Bacteria are single-celled microorganisms that are present all around us. They are found in the air, water and soil. They are of different shapes (Figure 2.4). Some of them are harmful by causing different diseases such as Food Poisoning, Pneumonia, Tuberculosis, etc. (Figure 2.3). However, many of them are beneficial for us.



Food poisoning caused by bacteria

Figure 2.3



Different forms of bacteria

Figure 2.4

## Activity 2.1

Draw different shapes of bacteria in the boxes given below.

Rod shaped

Round shaped

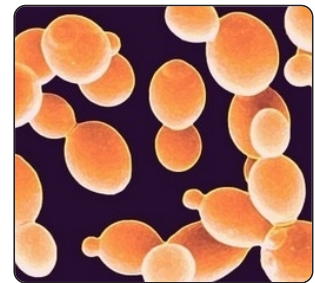
Spiral shaped

## Fungi (Moulds and Yeasts)

Fungi cannot make their own food. They absorb food from the source they are growing on. Some fungi grow and feed on dead material while others feed on living plants and animals. Most fungi are harmless but some cause diseases in plants and humans. Moulds and yeasts are common examples of microscopic fungi (Figure 2.5).



Mould on bread



Yeast

Figure 2.5 Some fungi

### Interesting Information

- There are more than 5,000 known kinds of bacteria.
- A cup of yogurt has billions of bacteria.

### Activity 2.2

Conduct a discussion about microorganisms, their classification, what they do, and where they are found in the natural environment.

## 2.3 Advantages and Disadvantages of Microorganisms

Most of the microorganisms do not cause diseases and are beneficial. Some advantages and disadvantages of microorganisms are mentioned below:

### Advantages of Microorganisms

#### (i) Making foods

Some microorganisms such as bacteria and yeast are used in the manufacture of different foods. For example, yeast help in making of bread and cheese while bacteria help in yogurt making (Figure 2.6).



**Figure 2.6** Food products (bread, cheese, yogurt) manufactured with the help of microorganisms

#### (ii) Help in digestion

Many bacteria live in human intestine and help in digestion of food.

#### (iii) Making medicines

Some fungi are used to obtain antibiotics (Figure 2.7). Antibiotics are the compounds that are used to kill and control the growth of bacteria which cause diseases in humans and animals.



**Figure 2.7** Antibiotics derived from fungi

Now-a-days, many types of antibiotics are used against the bacterial diseases. The first antibiotic called "**Penicillin**" was obtained from a fungus, "Penicillium".

#### (iv) Microorganisms as decomposers

Some microorganisms such as bacteria and fungi break down the dead bodies into simpler substances. These simpler substances are mixed in the soil for reuse by the plants and other organisms. Such microorganisms which break down the dead bodies by natural process are called decomposers. In this way, microorganisms recycle the materials between living and non-living environment.

### Disadvantages of microorganisms

#### (i) Diseases

Many of the microorganisms cause diseases in humans, animals and plants. Some viral diseases are common cold, influenza, measles, chicken pox, polio, hepatitis and AIDS.

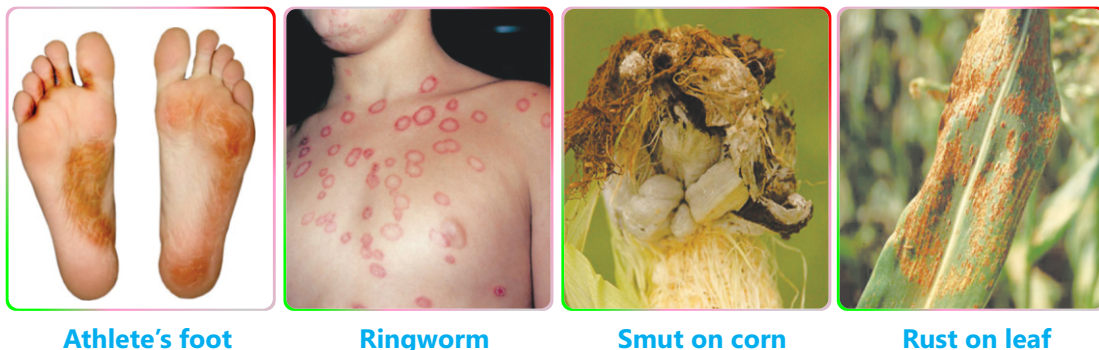


Figure 2.8

Certain bacteria cause cholera, typhoid and food poisoning in humans. Some fungi also cause diseases in animals and plants. Athlete's foot, ringworm in humans and rust, smut in wheat, corn, rice and sugarcane are fungal diseases (Figure 2.8).

#### (ii) Spoilage of food

Some microorganisms spoil food by growing in it and make it unfit for human use (Figure 2.9). Examples are souring of milk by



Figure 2.9 Spoilage of fruit by microorganisms

bacteria, the growth of mould on bread, and the rotting of fruits and vegetables by bacteria and fungi both.

### Information

Microorganisms which cause diseases are called pathogens.

### Activity 2.3

- Place a wet slice of bread in a cabinet.
- Leave it for a few days and then observe.
- Record your observations and discuss them with your teacher and classmates.



### Investigate

Food gets spoiled if not stored properly. Investigate a few ways of storing food to keep it safe and fresh.

## 2.4 Infection

The attack of disease-causing microorganisms in the body of an animal or plant is called infection (Figure 2.10). Infectious diseases quickly spread from one individual to another.



Figure 2.10 Infection

### Some common infectious diseases

Viral diseases	Bacterial diseases	Fungal diseases
• Influenza	• Food poisoning	• Athlete's foot
• Common cold	• Pneumonia	• Ringworm
• Chicken pox	• Typhoid	• Rust
• Polio	• Cholera	• Smut
• Hepatitis	• Tuberculosis	
• AIDS		



## Activity 2.4

Colour the box green if the infection is caused by bacteria, yellow for viruses, and pink for fungi.

Infection	Bacteria	Virus	Fungi
Polio			
Typhoid			
Athlete's foot			
Measles			
Cholera			
Flu			

### How do microorganisms enter human body?

Microorganisms can enter the human body by the following ways (Figure 2.11):

#### Through air

When a person sick with flu sneezes, germs are spread in the air. These germs can enter the lungs of another person who breathes in such an air.

#### Through water

Some harmful microorganisms are transferred in the human body by drinking water containing microorganisms.

#### Caution!

We should drink boiled water to avoid water borne diseases.

#### Through contaminated food

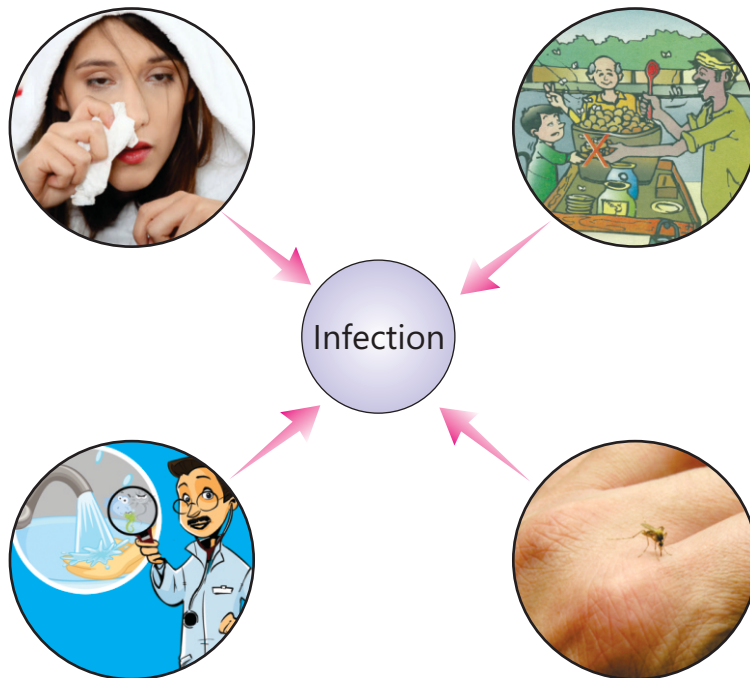
Contaminated food contains harmful microorganisms. These microorganisms enter the body of a person who eats the contaminated food.

## Through animals

Animals like mosquitoes transfer the harmful microorganisms into the body of a person during blood sucking.

## Through cuts on the skin

Scratches or cuts on the skin also provide entry points for germs. Bacteria causing tetanus enter the body through cuts or injuries on the skin.



**Figure 2.11** Microorganism enter human body through air, contaminated food, water, insect bite, and cause infection

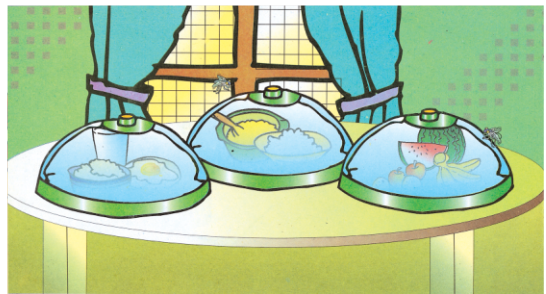
## Ways to avoid infections

Here are some simple ways to prevent infections (Figure 2.12):

- Dirty hands are the major source of germs. Wash your hands frequently especially before eating and after using toilet.
- Always eat healthy and fresh food. Wash fruits before eating them. Always cover the food.
- Brush your teeth regularly after meal, before going to bed and early in the morning.



- Keep your homes, schools and surroundings clean.
- Take a bath at least once a day.
- In case of injury or cut on the skin, clean it and cover it with a bandage and consult a doctor.
- Cut your nails regularly.



**Figure 2.12** Ways to avoid infections

**Activity 2.5**

- Make a poster showing a few ways to avoid infections.
- Display the poster in your classroom.

**Science, Technology, Society and Environment**

- Antibiotics are produced from the microorganisms (fungi) grown in large containers having a liquid.
- Antibiotics are extracted, purified and packed for use. Antibiotics are the medicines used to kill and control the growth of bacteria which cause diseases in humans and animals.
- Viral infections are prevented by vaccinations. If we get vaccinated against a disease, it makes our body safe from that disease.

**KEY POINTS**

- Microorganisms are the living things which can only be seen with the help of a microscope.
- Viruses are the smallest of all microorganisms. They are not visible under the simple microscope. They can be seen with the help of an electron microscope.
- Bacteria are microscopic single-celled organisms that exist all around us. They are important because of both their harmful and beneficial effects.
- Moulds and yeasts are the examples of microscopic fungi.
- An infection is an attack of disease causing microorganisms in the body of an animal or plant.
- The most frequent viral infections are common cold, chicken pox, dengue fever, hepatitis, the Acquired Immune Deficiency Syndrome (AIDS), etc.
- Common bacterial infections include pneumonia, typhoid, cholera, food poisoning, etc.
- Ringworm, athlete's foot, rust and smut, etc. are the common fungal

diseases.

- Microorganisms enter the human body through air, water, food, animal bite or injuries.
- We can avoid infection by:
  - i. taking a bath regularly and washing our hands before eating and after using toilet.
  - ii. using boiled water and fresh food.
  - iii. keeping our surroundings clean.
  - iv. using bandage over the injuries.
  - v. making no contact with people suffering from flu, common cold, chicken pox, etc.

## QUESTIONS

### 2.1. Choose the best answer:

- i. Which one of the following diseases is caused by virus:
  - a. AIDS
  - b. diarrhoea
  - c. cholera
  - d. ringworm
- ii. Viruses can be seen with the help of:
  - a. naked eye
  - b. magnifying glass
  - c. light microscope
  - d. electron microscope
- iii. Tuberculosis is caused by:
  - a. fungi
  - b. virus
  - c. bacteria
  - d. protozoa
- iv. Fungi are the organisms which:
  - a. absorb food from surrounding.
  - b. ingest food.
  - c. depend on viruses for food.
  - d. can prepare their own food.

- v. The first antibiotic was prepared from:
- |               |             |
|---------------|-------------|
| a. bacteria   | b. yeast    |
| c. Pencillium | d. mushroom |
- vi. Antibiotics are used to control the growth of:
- |             |            |
|-------------|------------|
| a. bacteria | b. insects |
| c. plants   | d. algae   |

**2.2 Fill in the blanks with suitable word:**

- i. Polio is caused by -----.
- ii. Cholera and typhoid in humans are caused by -----.
- iii. Rust and smut are caused by -----.
- iv. Bacteria causing tetanus enter the body through ----- in skin.
- v. We can find ----- all around us, in food, air and in our bodies.

**2.3 Give short answers:**

- i. What is a microorganism?
- ii. Write names of two products which are made with the help of bacteria.
- iii. Where can microorganisms be found?
- iv. What are the major groups of microorganisms?
- v. Can microorganisms be helpful? If yes, give examples.
- vi. What is infection?
- vii. Name two diseases which are caused by viruses.

**2.4 By which ways microorganisms can enter the human body? Discuss briefly.**

**2.5 How can we avoid infections?**





**2.6 Describe disadvantages of microorganisms.**

**2.7 Write brief notes on:**

- i. Decomposers      ii. Antibiotics

# Project

Read the statements in column A; identify the microorganisms in column B. Mention whether it is helpful or harmful in column C.

Column A	Column B	Column C
 <p>Making of yogurt</p>	<p>Bacteria</p> <p>Fungi</p> <p>Virus</p>	<p>Helpful</p> <p>Harmful</p>
 <p>Decomposition of dead leaves</p>	<p>Bacteria</p> <p>Fungi</p> <p>Virus</p>	<p>Helpful</p> <p>Harmful</p>
 <p>Making of bread</p>	<p>Bacteria</p> <p>Fungi</p> <p>Virus</p>	<p>Helpful</p> <p>Harmful</p>
 <p>Rotten apple</p>	<p>Bacteria</p> <p>Fungi</p> <p>Virus</p>	<p>Helpful</p> <p>Harmful</p>

## Column A



Cause of chicken pox

## Column B

Bacteria

Fungi

Virus

## Column C

Helpful

Harmful



Making of cheese

Bacteria

Fungi

Virus

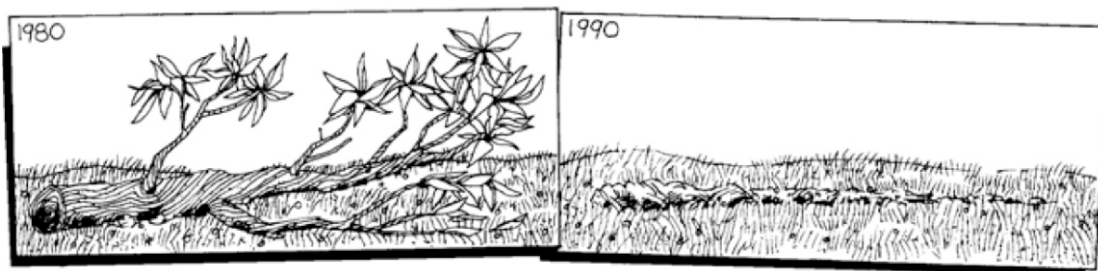
Helpful

Harmful

## Think-Tank

Viral infections are prevented by vaccinations. If we get vaccinated against a disease, it makes our body safe from that disease. Discuss with your teacher:

- What are vaccines?
- How they make our body safe from diseases?



1. In the illustration above, a change has taken place over time. What kind of microorganism has caused the change?

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2. Is this change helpful or harmful for the environment?

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