2. MICROORGANISMS: FRIEND AND FOE

MICROORGANISM AND THEIR TYPES

KEY CONCEPT

- **MICROORGANISM:** Tiny living organisms invisible to the naked human eye and can be seen with the help of a microscope.
- **MICROBIOLOGY:** The field of study of microorganisms.
- Microorganisms are present all around us and even inside our bodies.
- Microbes are of five major kinds–bacteria, fungi, algae, protozoa and viruses.

ACTIVITY 1

- Collect some moist soil from the field in a beaker and add water to it. After soil particles have settled, observe a drop of water from the beaker under a microscope. What do you see?
- Take a few drops of water from a pond. Spread on a glass slide and observe through a microscope.

CONCLUSION: _____

SOLVED QUESTIONS

1. What are microorganisms? Mention the different kinds of microorganisms.

Ans. Microorganisms are tiny organisms which cannot be seen by naked eyes. Such tiny organisms are found all around us. The different kinds of microorganisms are:- Bacteria, Algae, fungi, Protozoa and viruses.

2. Mention the different habitats in which microorganisms are found.

Ans. Microorganisms are found all around us in all types of places in air, in water, in soil, on plants, inside our bodies and those of all other animals. They can survive under all types of environments and in extremely harsh conditions.

3. How are viruses different from other microbes?

Ans. Viruses different from other microbes as they lacks cellular structure but can reproduce inside the cells of the host organism.

TEST YOUR CONCEPT

1. What is the study of microorganisms known as?

2. Microbes are disease-causing microorganisms. True or false?

3. Name the five groups into which microorganisms are divided. Which of these have only unicellular organisms?

4. Why are viruses considered to be on the borderline of living and non-living?

5. What are spherical bacteria called?

ADVANTAGES OF MICROORGANISM

KEY CONCEPT

- Microorganism live in kinds of environments, ranging from ice cold climate to hot springs, deserts and bottom of sea. Some microorganism are beneficial to us.
- Microorganism are useful in several ways — (i) production of antibiotics, (ii) source of food, (iii) in bread-making, (v) increasing soil fertility, (vi) cleaning of environment.

- **Fermentation:** The process of conversion of sugar into alcohol.
- **Antibiotics:** Antibiotics are chemicals that kill or stop the growth of pathogens.

ACTIVITY 1

- Take ½ kg flour (*atta* or *maida*), add some sugar and mix with warm water. Add a small amount of yeast powder and knead to make a soft dough. What do you observe after two hours? Did you find the dough rising?

Maida with Yeast Powder

Raised maida

CONCLUSION: _____

ACTIVITY 2

- Take a 500 mL beaker filled upto ¾ with water. Dissolve 2-3 teaspoons of sugar in it. Add half a spoon of yeast powder to the sugar solution. Keep it covered in a warm place for 4-5 hours. Now smell the solution. Could you get a smell?

CONCLUSION: _____

ACTIVITY 3

- Take two pots and fill each pot half with soil. Mark them A and B. Put plant waste in pot A and things like polythene bags, empty glass bottles and broken plastic toys in pot B. Put the pots aside. Observe them after 3-4 weeks.

CONCLUSION: _____

SOLVED QUESTIONS

1. What beneficial role do microorganisms play in the life of human beings?

Ans. Microorganisms play an important role in our live as well as in the environment some of them are useful for humans while others are harmful and cause diseases.

2. Why do farmers cultivate plants of pea family?

Ans. Farmers grow pea plants as these plant contains root nodules which helps in nitrogen fixation and replenish the nutrients into the soil which is furthur consumed by plants for their growth.

3. Who discovered the antibiotic penicillin?

Ans. Alexander fleming

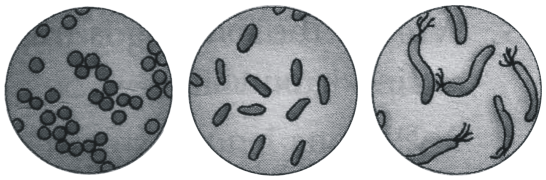
4. Which vaccine is given to children orally at the age of 1.5, 2.5 and 3.5 months?

Ans. Oral Polio vaccine

TEST YOUR CONCEPT

1. Discuss three important ways in which bacteria are useful to us.

2. Name the three types of bacteria shown in the figure given below.



a. b. c.

3. What kinds of living organisms are classified under algae? Give two examples.

4. Give two important use of algae.

5. What is fermentation?

PATHOGENS

KEY CONCEPT

- **PATHOGENS:** The disease-causing microorganisms.
- **Diseases-Caused by Microorganisms:** communicable diseases
- **Mode of Transmission:** Spread through air, water, carriers and direct method.

SOLVED QUESTIONS

1. Mention the ways in which the following microoganisms are harmful to mankind: Bacteria, protozoa and viruses.

Ans. Microorganisms such as bacteria, Protozoa and viruses cause a lot of diseases in human beings

Some common disease caused by microorganisms in humans

Bacteria — cholera, typhoid, TB, anthrax

Protozoa — malaria, sleeping sickness

Virus — common cold, chicken pox, polio

2. Which microorganism causes the 'foot and mouth disease' in cattle?

Ans. Viruse (Foot and mouth virus)

3. Name two diseases which are spread by the houseflies.

Ans. Typhoid and cholera

TEST YOUR CONCEPT

1. Is the decomposition of the bodies of dead plants and animals by microorganisms desirable or undesirable?

2. Under what circumstances can viruses reproduce?

3. Discuss the different ways in which communicable diseases spread from person to person.

FOOD POISIONING AND PRESEVATION

KEY CONCEPT

- **FOOD POISIONING:** Spoilage of food takes place because of the action of microorganisms like bacteria and fungi.
- **FOOD PRESEVATION:** It is the process of preventing food from spoilage.
- **METHOD OF PRESEVATION:** Preservation of food can be done by drying, heating, salting or by adding sugar, chemicals or by freezing and pasteurisation.
- **NITROGEN FIXATION:** The process of converting atmospheric nitrogen into compounds of nitrogen.

SOLVED QUESTIONS

1. Mention the role of nitrogen-fixing bacteria in soil.

Ans. Role of nitrogen fixing bacteria—

The conversion of atmospheric nitrogen into compounds of nitrogen is called nitrogen fixations. This can be done by the help of microorganisms. The bacterium RHIZOBIUM lives in root nodules and fixes nitrogen for the leguminous plant.

2. Mention some advantages of food preservation.

Ans. Advantages of food preservation:

a. Reduces food wastage by avoiding spoilage. b. Increases the storage period of foodstuff.

c. Nutritive value is retaived for longer period.

3. Define pasteurisation.

Ans. The method in which liquid is heated to about 70ºC for 15-30 seconds to kill bacteria then it is cooled quickly to prevent bacterial growth. This method of preservation is called pasteurisation.

4. Name two methods of food preservation.

Ans. Chemical and physical method.

5. What is preserved by pasteurisation method?

Ans. Milk

TEST YOUR CONCEPT

1. How does cooling help in food preservation?

2. What causes food poisoning?

3. Discuss two methods of food preservation.

4. Name the class of medicines usually made from fungi or bacteria that can cure dangerous diseases.

5. What is heating milk to a high temperature and then cooling it quickly called ?

NCERT EXERCISES

1. Fill in the blanks:

(a) Microorganisms can be seen with the help of a _____.

(b) Blue green algae fix _____ directly from air to enhance fertility of soil.

(c) Alcohol is produced with the help of _____.

(d) Cholera is caused by _____.

2. Tick the correct answer:

(a) Yeast is used in the production of

(i) sugar (ii) alcohol (iii) hydrochloric acid (iv) oxygen

(b) The following is an antibiotic

(i) Sodium bicarbonate (ii) Streptomycin (iii) Alcohol (iv) Yeast

(c) Carrier of malaria-causing protozoan is

(i) female *Anopheles* mosquito (ii) cockroach

(iii) housefly (iv) butterfly

(d) The most common carrier of communicable diseases is

(i) ant (ii) housefly (iii) dragonfly (iv) spider

(e) The bread or *idli* dough rises because of

(i) heat (ii) grinding (iii) growth of yeast cells (iv) kneading

(f) The process of conversion of sugar into alcohol is called

(i) nitrogen fixation (ii) moulding (iii) fermentation (iv) infection

3. Match the organisms in Column I with their action in Column II.

Column I	**Column II**
(i) Bacteria	(a) Fixing Nitrogen
(ii) *Rhizobium*	(b) Setting of curd
(iii) *Lactobacillus*	(c) Baking of bread

(iv) Yeast
(v) A protozoan
(vi) A Virus

(d) Causing Malaria
(e) Causing Cholera
(f) Causing AIDS
(g) Producing antibodies

4. Can microorganisms be seen with the naked eye? If not, how can they be seen?
5. What are the major groups of microorganisms?
6. Name the microorganisms which can fix atmospheric nitrogen in the soil.
7. Write 10 lines on the usefulness of microorganisms in our lives.
8. Write a short paragraph on the harms caused by microorganisms.
9. What are antibiotics? What precautions must be taken while taking antibiotics?

CHECK YOURSELF

MULTIPLE CHOICE QUESTIONS

1. Low temperature prevents spoilage of food because it :-
a. retards microbial growth
b. inactivates enzymes
c. both a & b
d. removes water from food materials

2. Which of the following is found to be present in curd ?
a. Lactobacillus b. Rhizobium c. Lactovirus d. Lactococcus

3. The microorganism used in preparation of bread is :-
a. yeast b. adenovirus c. Penicillium d. blue green algae

4. Some microbes have a hard outer cover called :-
a. protein coat b. mucilaginous sheath c. disc d. cyst

5. A vaccine contains :-
a. active disease causing microbes
b. weakened or killed microbes
c. antibiotic dose
d. combination of medicines

6. A group of similar microorganisms living together is called :-
a. factory b. colony c. herd d. capsule

7. Atmosphere comprises of 78% :-
a. oxygen gas b. hydrogen gas c. nitrogen gas d. carbondioxide gas

8. Nitrogen is never a part of :-
a. proteins b. carbohydrates c. vitamins d. chlorophyll

9. Which group of microorganisms contains only pathogenic members ?
a. viruses b. protozoans c. fungi d. algae

10. Some bacteria like E. coli living in human intestine synthesise :-
a. vitamin E b. vitamin B c. antibiotics d. glycogen

11. The first antibiotic was prepared from a :-
a. fungus b. bacterium c. protozoan d. alga

12. Viruses can be :-
a. stored b. crystallised c. isolated d. all the above

13. The group of microorganisms where all members contain chlorophyll is:-
a. fungi b. bacteria c. protozoa d. algae

14. Louis Pasteur discovered :-
a. Pasteurisation b. Fermentation c. both a & b d. Putrefaction

15. Fixation of nitrogen can occur :-

a. naturally b. artificially c. both a & b d. only during rains

16. Organisms responsible for recycling of matter in nature is/are :-

a. bacteria b. viruses c. fungi d. both a & c

17. A denitrifying bacterium is :-

a. Pseudomonas b. Pseudopodia c. Nitrosomonas d. Nitrobacter

18. When a disease causing microbe enters into our body, defense system produces :-

a. antigens b. antibodies c. antibiotics d. both a & b

19. Which of the following is a biological nitrogen fixer ?

a. bacteriophage b. lactobacillus c. blue green algae d. Euglena

20. A common preservative used in jam and pickles is

a. Sodium benzoate b. Nitric acid c. Sodium Chloride d. Copper Sulphate

21. Rhizobium found in root nodules of leguminous roots is an

a. Atmospheric Carbon fixer b. Atmospheric Oxygen fixer
c. Atmospheric Nitrogen fixer d. All of the above

22. Lactobacillus is commonly found in

a. Cake b. Curd c. Bread d. All of the above

23. The process of conversion of sugar into alcohol by yeast is called

a. Fermentation b. Pasteurisation c. Alcoholism d. All of the above

24. The pores in the bread is due to gas bubbles of

a. Oxygen b. Nitrogen di oxide c. Nitrogen d. Carbon di oxide

25. The microbe for Malaria is carried by

a. Male Anopheles Mosquito b. Female Anopheles Mosquito
c. Male Aedes Mosquito d. Female Aedes Mosquito

ORAL QUESTIONS

1. Why should we avoid standing close to tuberculosis patient while he/she is coughing?

2. Polio drops are not given to children suffering from diarrhoea. Why?

3. What is a microorganism?

4. Name the five groups into which microorganisms are divided.

5. Name two diseases that are caused by viruses.

6. What will happen to 'pooris' and 'unused kneaded flour' if they are let in open for a day or two?

7. "Virus are living or non-living." Comment with reasons.

8. Farmers prefer to grow beans and peas in nitrogen deficient soils. Give reason.

9. Why raw vegetables and fruits are kept in refrigerators whereas jams and pickles can be kept outside?

10. Mosquitoes can be controlled by Preventing stagnation of water though they do not live in water. Why?

TRUE/FALSE

1. Microbes are disease causing microorganisms.

2. All fungi are unicellular.

3. A virus can reproduce on its own.

4. Food poisoning is caused by a toxin getting accidentally mixed with food.

5. Salt forces microbes to lose water.

FILL IN THE BLANKS

1. Under unfavourable conditions, microorganisms form a _____ around themselves.
2. The female aedes mosquito is a carrier of the _____ virus.
3. The foot and mouth disease is caused by a _____.
4. Fermentation is _____.
5. Citrus canker is caused by _____.
6. Deliberately injecting weak microbes into a healthy body and producing antibodies to fight against strong microbes is called _____.
7. Some medicines obtained from micro-organisms are applied to kill or stop the growth of disease-causing microorganisms. Such medicines are called _____.
8. Diseases like polio and chicken pox are caused by _____.

SUMMATIVE ASSESSMENT

SHORT ANSWER TYPE QUESTIONS

1. What is a microorganism?
2. Name the five groups into which microorganisms are divided. Which of these have only unicellular organisms?
3. What kinds of living organisms are classified under algae? give two examples.
4. Under what circumstances can viruses reproduce?
5. Give one important use of algae.
6. How does cooling help in food preservation ?
7. What causes food poisoning?
8. What is pasteurization?
9. How does mosquito help in spreading viruses/microorganisms?
10. Microorganisms are found even in places where no other life forms can exist .What makes microorganisms so hardy?
11. Which microorganism is used to make bread soft and fluffy? Discuss how this happens.
12. What is fermentation? Discuss its use in making alcoholic beverages.
13. How do viruses cause diseases ?
14. How does a vaccine work ?
15. How does salt prevent food spoilage?
16. What is dehydration of food ? In what way is this technique useful?
17. Which microorganisms act as decomposers? How is this activity useful to us?

LONG ANSWER TYPE QUESTIONS

1. Why are viruses considered to be on the borderline of living and non living?
2. Discuss four important ways in which bacteria are useful to us and four ways in which they are harmful.
3. Discuss the different ways in which communicable diseases spread from person to person.
4. Discuss five methods of food preservation.