

4 LIFE UNDER A MICROSCOPE

I. Multiple choice questions: Tick (✓) the correct choice.

1. Bacilli bacteria are

- (a) rod-shaped
- (b) spiral in shape
- (c) ball-shaped
- (d) variable in shape

Ans. (a)

2. Bacteria, on the basis of nutrition, may be

- (a) autotrophic
- (b) heterotrophic
- (c) both autotrophic and heterotrophic
- (d) symbiotic

Ans. (c)

3. Fungi, on the basis of nutrition, are

- (a) saprophytic
- (b) parasitic
- (c) autotrophic
- (d) saprophytic and parasitic

Ans. (d)

4. Algae are found

- (a) in water
- (b) on tree branches
- (c) on land
- (d) on mountains

Ans. (a)

5. Heterocyst is found in

- (a) algae
- (b) brown algae
- (c) blue-green algae
- (d) diatoms

Ans. (c)

6. Sleeping sickness is caused by an

- (a) protozoan
- (b) fungus
- (c) alga
- (d) bacterium

Ans. (a)

7. Non-cellular microbes are

- (a) bacteria
- (b) fungi
- (c) viruses
- (d) diatoms

Ans. (c)

8. Yeast helps in the production of

- (a) sugar
- (b) alcohol
- (c) oxygen
- (d) agar

Ans. (b)

9. Pasteurisation of milk destroys its

- (a) vitamins
- (b) fat content
- (c) bacteria
- (d) none of the above

Ans. (c)

10. The bread or dosa dough rises because of the action of

- (a) heat
- (b) growth of yeast cells
- (c) kneading or grinding
- (d) all the above

Ans. (b)

11. Salting the food helps to preserve it by

- (a) extracting water from the cells
- (b) lowering its temperature
- (c) increasing its acidity
- (d) none of the above

Ans. (a)

12. Algae are an important part of the aquatic food chain because they are

- (a) decomposers
- (b) producers
- (c) consumers
- (d) none of the above

Ans. (b)

13. Which of these is a colonial alga?

- (a) *Chlamydomonas*
- (b) *Chlorella*
- (c) *Spirogyra*
- (d) *Volvox*

Ans. (d)

14. Amoebic dysentery is caused by

- (a) *Amoeba*
- (b) *Entamoeba*
- (c) *Plasmodium*
- (d) *Giardia*

Ans. (b)

15. Organisms on the borderline of the living and non-living are

- (a) viruses
- (b) bacteria
- (c) fungi
- (d) algae

Ans. (a)

16. Which group of organisms make their own food?

- (a) Virus
- (b) Algae
- (c) Fungi
- (d) Protozoa

Ans. (b)

17. All organisms belonging to protozoa are
(a) unicellular (b) multicellular
(c) colonial (d) none of the above
- Ans.** (a)
18. Pneumonia is caused by
(a) virus (b) *Amoeba* (c) bacteria (d) *Paramecium*
- Ans.** (c)
19. Cocci bacteria are
(a) rod-shaped (b) spherical (c) spiral (d) triangular
- Ans.** (b)
20. Bacteria that can grow only in the absence of oxygen are called
(a) saprophytic bacteria (b) parasitic bacteria
(c) anaerobic bacteria (d) aerobic bacteria
- Ans.** (c)
21. All fungi are
(a) autotrophic (b) parasitic
(c) saprophytic (d) parasitic or saprophytic
- Ans.** (d)
22. Brown algae contain
(a) only chlorophyll
(b) chlorophyll and a brown pigment
(c) chlorophyll and a blue pigment
(d) chlorophyll, red and blue pigments
- Ans.** (b)
23. *Chlamydomonas* is a
(a) unicellular animal (b) multicellular animal
(c) unicellular plant (d) multicellular plant
- Ans.** (c)
24. *Chlorella* is a
(a) motile protozoa (b) non-motile alga
(c) virus (d) fungi
- Ans.** (b)
25. Botulism is a kind of food poisoning caused by
(a) *Clostridium* (b) *Salmonella* (c) *Amoeba* (d) Diatom
- Ans.** (a)

II. Fill in the blanks.

1. Micro-organisms can be seen with the help of a
2. The largest fungi are the
3. Algae can prepare their own food because they possess
4. Iodine is obtained from
5. Agar is obtained from
6. The plant body in multicellular fungi is made up of
7. Viruses are in size than bacteria.
8. The fungus that grows on bread is known as
9. Bacteria generally reproduce by
10. The virus which attacks bacteria is called
11. Cell walls of diatoms are a rich source of
12. The disease-causing micro-organisms are called
13. are the simplest green plants that contain chlorophyll and usually live in water.
14. are the micro-organisms without chlorophyll.
15. Under unfavourable conditions, micro-organisms form a around themselves.
16. *Paramecium* moves with the help of present on its body surface.
17. The bacteria that need oxygen to grow are called bacteria.
18. bacteria decompose dead remains of plants and animals.
19. Improperly canned food can cause a dangerous disease called
20. is a filamentous alga.

Ans. 1. Microscope 2. Mushroom 3. Chlorophyll 4. Algae 5. Algae
6. Mycelium 7. Smaller 8. Bread mould 9. Binary fission
10. Bacteriophage 11. Silica 12. Pathogens 13. Algae 14. Fungi
15. Cyst 16. Cilia 17. Aerobic 18. Saprophytic 19. Botulism
20. *Spirogyra*.

III. Find the odd one out. Give reasons in support of your answer.

1. Algae, fungi, protozoa, flowering plants

Ans. Protozoa

Reason: Protozoa belongs to animal kingdom while rest of them are belongs to plant kingdom.

2. *Chlorella*, *chlamydomonas*, yeast, bread mould

Ans. Bread mould

Reason: All are unicellular except bread mould.

3. *Chlorella*, *Spirogyra*, diatoms, mushroom

Ans. Mushroom

Reason: All are microscopic except mushroom.

4. *Chlamydomonas*, *Spirogyra*, *Volvox*, yeast

Ans. Yeast

Reason: All are algae except yeast which is fungi.

5. *Spirogyra*, *Ulothrix*, *Volvox*

Ans. Spirogyra

Reason: *Volvox* is a colonial algae while *spirogyra*, *Ulothrix* are filamentous algae.

IV. Which of the following statements are true (T) and which ones are false (F)? Mark T or F:

1. Malaria is caused by a virus.
2. Germ theory of disease was given by Leeuwenhoek.
3. Study of fungi is called mycology.
4. Plague is caused by the bite of infected rat fleas.
5. Agar is obtained from blue-green algae.
6. Study of algae is called phycology.
7. Moulds are a type of fungi.
8. Red algae do not have chlorophyll.
9. Algae are mostly found in water.
10. All fungi are parasitic.
11. A virus can reproduce only when it enters a living cell.
12. Micro-organisms grow very well in extreme dry conditions.
13. The class of medicines obtained from bacteria or fungi are called antibiotics.

14. A spore-forming organism that lacks chlorophyll and absorbs food substances made by other organisms is an alga.

15. Algae are nature's scavengers.

Ans. 1. F 2. F 3. T 4. F 5. F 6. T 7. T 8. F 9. T 10. F 11. T 12. F 13. T 14. F 15. F

V. Match the statements in Column A with those in Column B.

<i>Column A</i>	<i>Column B</i>
1. Phycology	(a) an alga
2. Spirillia	(b) a disease
3. <i>Chlorella</i>	(c) study of algae
4. Measles	(d) curd making
5. <i>Lactobacillus</i>	(e) a kind of bacterium
6. Typhoid	(f) viral disease
7. Polio	(g) bacteria disease
8. Ringworm	(h) protozoan disease
9. Diarrhoea	(i) fungal disease
10. <i>Plasmodium</i>	(j) malaria

Ans. 1. (c) 2. (e) 3. (a) 4. (b) 5. (d) 6. (g) 7. (f) 8. (i) 9. (h) 10. (j)

VI. Name the following:

1. A bacterium that helps in the curdling of milk.

Ans. A bacterium that helps in the curdling of milk is *Lactobacillus*.

2. A fungus used in the preparation of antibiotics.

Ans. A fungus used in the preparation of antibiotics is *Penicillium*.

3. A fungus used in bread industry.

Ans. A fungus used in bread industry is yeast.

4. The specialised cell found in blue-green algae.

Ans. The specialised cell found in blue-green algae is called *heterocyst*.

5. A micro-organism used in the production of alcohol.

Ans. A micro-organism used in the production of alcohol is *yeast*.

6. Two diseases caused by bacteria, fungi, protozoa and viruses.

Ans. Diphtheria & tuberculosis are caused by bacteria.

Ringworm & athletes' foot are caused by fungi.

Malaria & sleeping sickness are caused by protozoa

Polio & rabies are caused by virus.

7. The scientist who discovered penicillin.

Ans. *Alexander Fleming* was the discoverer of penicillin.

8. Two food items prepared by using yeast.

Ans. Bread and beer are the food items prepared by using yeast.

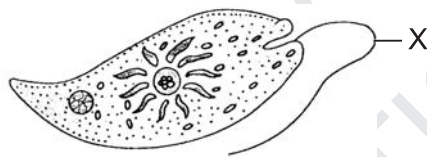
9. A nitrogen-fixing bacterium.

Ans. *Rhizobium* is a nitrogen-fixing bacterium.

10. Malaria causing micro-organism.

Ans. Malaria is caused by a protozoan *Plasmodium*.

VII. The diagram below depicts a micro-organism:



(i) Name the microorganism.

Ans. This microorganism is *Euglena*.

(ii) Label the parts marked — X.

Ans. Part X is flagellum.

(iii) Why is micro-organism considered a plant?

Ans. This micro-organism is considered to be a plant due to presence of chlorophyll.

(iv) Where is this micro-organism found?

Ans. This micro-organism is found in ponds and ditches.

VIII. Give reasons.

1. Your mother dries certain vegetables and stores them in airtight containers.

Ans. Drying of vegetables reduces the moisture content. In the dry conditions, micro-organisms cannot grow. This process is generally done by sunlight.

2. Surgical instruments are boiled in water before using them for an operation.

Ans. Surgical instruments are boiled in water, before using them for an operation, to destroy the harmful micro-organisms which can infect the body of a patient.

3. Saprophytic bacteria and fungi are useful to mankind.

Ans. Saprophytic bacteria and fungi are useful to mankind because they decompose the dead, decaying bodies of plants and animals. Without these organisms, earth would be full of dead bodies. These organisms are also called nature's scavengers.

4. The dough prepared for making *idli* rises when kept overnight.

Ans. The dough rises when kept overnight. It is due to presence of yeast. The yeast uses the sugar present with dough as food. During this process carbon dioxide and alcohol are formed and they make the dough rise.

5. Food is kept in the refrigerator to prevent spoilage.

Ans. Food is kept in the refrigerator because it prevents the growth and multiplication of micro-organisms.

6. It is difficult to set curd in winters.

Ans. It is difficult to set curd in winters because in winters, activities of micro-organism become lower.

7. The green scum floating on water is often called 'grass of water.'

Ans. We have noticed the green scum floating on the surface of water. It is green algae found on the stagnant water. We often called it grass of water because it is used as food by aquatic organisms.

8. *Euglena* can be considered a plant as well as an animal.

Ans. *Euglena* can be considered as plant as well as an animal because it contains the properties of a plant as well as an animal. One of the most characteristic features of *Euglena* is the presence of chloroplasts that carry out photosynthesis and grouped it under plants.

IX. Which among the following diseases are caused by virus, bacteria, fungi and protozoa?

- | | |
|---------------------------|---------------|
| (a) Late blight of potato | (b) Influenza |
| (c) Malaria | (d) Ringworm |
| (e) Dandruff | (f) Cholera |
| (g) Amoebic dysentery | (h) Measles |
| (i) Pneumonia | (j) Polio |

Ans. Late blight of potato, Ringworm, Dandruff are caused by fungi
Influenza, Measles, Polio are caused by viruses.
Malaria, Amoebic dysentery are caused by protozoans.
Cholera, Pneumonia are caused by bacteria.

X. Answer the following questions:

1. What are micro-organisms? Mention the different kinds of micro-organisms.

Ans. There are a number of living organisms in this world which can be seen by the naked eyes. But some living creatures in this world are so minute that cannot be seen by the naked eyes. To see these living creatures, we have to use magnifying glass or a microscope. These living creatures are called micro-organisms. Micro-organisms are useful as well as harmful to human beings.

Kinds of micro-organisms:

- | | | |
|-----------------|-------------|-------------|
| (i) Bacteria | (ii) Fungi | (iii) Algae |
| (iv) Protozoans | (v) Viruses | |

2. How do microbes survive in adverse environmental conditions?

Ans. Micro-organisms survive in adverse environmental conditions. In these conditions, they form a hard outer covering called the cyst. Consequently, they can survive under extreme temperature conditions and dryness.

3. Mention the different habitats in which micro-organisms are found.

Ans. Micro-organisms are ubiquitous, i.e., found all around us in all

types of places in soil, in air, and inside and outside of all other animals. These micro-organisms can live in very harsh environmental conditions like hot springs, saline water, ice-cold water and marshlands.

Some micro-organisms also present in dead and decaying organic matter. These organisms help in the decomposition of the animals body.

Some microorganisms living inside the animal's body are useful, e.g., *E.coli* and some are harmful, e.g. *Plasmodium*.

4. How are bacteria classified on the basis of the shapes?

Ans. Classification of bacteria: On the basis of shape, bacteria is of three types:

- (i) **Rod-shaped.** They are called bacilli (sing-bacillus) meaning little rod, e.g., *Bacillus*, *Lactobacillus*, and *Pseudomonas*.
- (ii) **Ball-shaped.** They are called cocci (sing-coccus) meaning berry, e.g., *Streptococcus*, *Sarcina* and *Micrococcus*.
- (iii) **Spiral or Corkscrew-shaped.** They are called spirilla (sing-spirillum) meaning spiral, e.g., – *Vibrio*, *Triponema* and *Camphilovector*.

5. Describe nutrition in bacteria.

Ans. On the basis of nutrition, bacteria are of two types:

- (i) **Autotrophs.** They can synthesise their own food. They may be of two types:
 - (a) **Photographs.** They utilise energy from sunlight.
 - (b) **Chemotrophs.** They utilise energy from inorganic compounds.
- (ii) **Heterotrophs.** They cannot synthesise their own food. They may be of two types:
 - (a) **Saprophytic.** They feed on soluble organic materials from dead animals or plants.
 - (b) **Parasitic.** They feed on organic material from the body of another living organism.

6. Describe reproduction in bacteria.

Ans. Reproduction in bacteria. Generally, bacteria reproduce by

binary fission. In binary fission, a bacterium divides into two and two into four and so on. In favourable conditions, in every 10 to 40 minutes, a bacterium divide into two and after a few hours there are a number of bacteria.

7. What are the three groups of organism fungi?

Ans. Three groups of fungi.

- (i) **Yeasts.** These are unicellular.
- (ii) **Moulds.** These are multicellular, e.g., bread mould
- (iii) **Mushroom.** These are also multicellular and macroscopic. Some mushrooms are also used as food.

8. Mention two important uses of fungi.

Ans. Two important uses of fungus.

- (i) **Production of antibiotics.** The main and important use of fungus is antibiotics production. These antibiotics are used to treat infections and diseases. For example, penicillin is obtained from a fungus, *Penicillium notatum*.
- (ii) **In breweri industry.** Yeast is used in for brew industry for the production of wines and bears from fruit juices and barley. It brings the fermentation of sugars into alcohol and carbon dioxide.

9. Why does the milk spoil quickly during summer?

Ans. During summer, the activity of bacteria is increase. So, if milk is not boiled, it is spoiled by bacteria. So it is necessary to boil milk in summer days and store at low temperature.

10. State two ways in which the following micro-organisms are harmful to mankind: bacteria, protozoa, viruses.

Ans. Harmful bacteria.

- (i) **Disease-causing bacteria.** Bacteria are disease-causing organisms and cause certain diseases in human beings, e.g., diphtheria, tuberculosis, pneumonia.
- (ii) **Spoilage of food.** Some bacteria spoil food and cause food poisoning.

Harmful protozoa.

Disease-causing protozoa. Several protozoans cause disease

in man. For example: *Plasmodium* causes malaria in man and *Entamoeba histolytica* causes amoebic dysentery in man.

Viruses. Viruses are non-cellular micro-organisms and are able to carry out life inside a host cell. Certain diseases such as measles, mumps, influenza, rabies, polio, AIDS are viral diseases.

11. How are viruses different from other microbes?

Ans. Viruses are different from other micro-organisms because they are non-cellular microbes. They have no life outside a living cell. Thus, viruses are called obligate parasites. Viruses are smaller than bacteria and can be seen only with the help of an electron microscope.

12. Why do farmers cultivate plants of pea family.

Ans. Farmers cultivate pea family plants because certain nitrogen-fixing bacteria live in the roots of these plants and form root nodules. These bacteria change nitrogen into substances that plants can use.

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

Ans. Nitrogen-fixing bacteria in the soil can take nitrogen from the atmosphere and change into substances that plants can use.

14. Name the causal organisms of the following diseases:

- | | |
|-----------------------|-----------------------|
| (a) Amoebic dysentery | (b) Sleeping sickness |
| (c) Measles | (d) Common cold |

Ans. Disease	Causal agents
Amoebic dysentery	<i>Entamoeba histolytica</i>
Sleeping sickness	<i>Trypanosma gambiens</i>
Measles	<i>Measles virus</i>
Common cold	<i>Rhinovirus</i>

15. Mention the contributions of the following:

- | | |
|-------------------|-----------------|
| (a) Louis Pasteur | (b) Leeuwenhoek |
|-------------------|-----------------|

Ans. (a) **Louis Pasteur.** Louis Pasteur was the first scientist who proved that microbes cause diseases. It was the Louis Pasteur who first stated the “germ theory of disease.”

(b) **Anton van Leeuwenhoek.** A.V. Leeuwenhock was the first scientist who discovered the new world of living

organisms which are too small to be seen with naked eyes.
These organisms are called micro-organisms.

16. Describe the role of blue-green algae in the fertility of soil.

Ans. Blue-green algae can fix atmospheric nitrogen. The addition of blue-green algae in the fields increases the nitrogen and humus content of the soil. Due to humus content, water-holding capacity of the soil increases and net result is better growth of crops. Thus, algae are used to increase soil fertility and act as a biofertiliser.

17. Mention some advantages of food preservation.

Ans. Advantage of food preservation:

- (i) It prevents the spoilage of food.
- (ii) It increases the period of stored food.
- (iii) It increases the availability of food in distant places and during off season.
- (iv) It retains the nutritive value of food for a long period.

18. Describe the different methods used to prevent the spoilage of food.

Ans. Different methods of food preservation:

There are some methods by which we can preserve food items for long period. There are as follows:

- (i) **By dehydration.** Removal of water from food material is called dehydration. This method is used from ancient time. Dehydration is done by sunlight. This method is generally used for vegetables like spinach, cauliflower and methi leaves.
- (ii) **By heating.** Heating of food material is another method which prevents the growth of micro-organisms. For example, milk is prevented from spoilage by boiling.
- (iii) **By salt and sugar solutions.** In salt and sugar solutions, cells of micro-organisms lose their water and do not grow. Fruits and vegetables are commonly preserved in salt and sugar solutions.

- (iv) **By refrigeration and freezing.** Cooling and freezing make the micro-organisms inactive and stops from growing and multiplying. A refrigerator is used for this purpose. It keeps food fresh for a few days.
- (v) **By pastuerisation.** In this method, firstly food material is heated to kill bacteria, then cooled very fast to prevent the further growth of bacteria and then stored at low temperature. This method is used to preserve milk.

19. Why are bacteria considered to be a plant?

Ans. Bacteria are considered to be a plant due to presence of cell wall. Which is an important characteristic of plant cells.

Although bacteria have features of both plants and animals.

20. Name three bacterial diseases in humans and three bacterial diseases in plants.

Ans. Bacterial diseases in humans:

(1) Diphtheria (2) Tuberculosis (3) Cholera.

Bacterial diseases in plants.

Ringspot of potato.

Late blight of potato

Bacterial wilt of cucurbits.

21. Name three organisms that reproduce by binary fission.

Ans. Organisms that reproduce by binary fission:

(i) *Amoeba* (ii) *Paramecium* (iii) *Euglena*

22. State the use of yeast in the breweries and bakeries.

Ans. Yeast is used in breweri industry for the production of wines and beer from fruit juices and barley. It brings the fermentation of sugars into alcohol and carbon dioxide.

In bread making, yeast is used in dough to make the dough rise. Dough rises due to production of CO₂. During baking, heat drives off the carbon dioxide and making the bread porous.

23. State the mode of nutrition in *Spirogyra*.

Ans. *Spirogyra* is fresh water green algae. It can synthesise their own food with the help of sunlight.

24. What are the conditions for the growth of micro-organisms?
Ans. Growth of micro-organisms depends on certain conditions:
(i) Temperature (ii) Moisture, and
(iii) Availability of food.
25. What is the need for food preservation?
Ans. Preservation of food is needed because due to bacterial action, spoilage of food occurs. Preservation of food reduces the food wastage and it also increases the storage period of foodstuff and retain the nutritive value of food for a longer period of time.
26. What is pasteurisation?
Ans. Pasteurisation. It is the method to preserve milk. Firstly milk is heated to kill bacteria at 72°C for 30 minutes, then cooled very fast to prevent the further growth of bacteria and then stored at low temperature.
27. How is a bacterial cell different from an ordinary plant cell?
Ans. Unlike plant cells, bacteria do have cellulose walls or chloroplast. Bacteria have filaments protruding from them called flagella. The bacterial cells do not contain a distinct membrane-bounded nucleus.
28. How are anaerobic bacteria different from aerobic bacteria?
Ans. Aerobic bacteria utilise free O₂ of the environment to oxidise organic compounds while anaerobic bacteria respire in the absence of oxygen.
29. List five ways by which algae are useful.
Ans. Five useful ways by which algae are useful:
(1) They are major sources of food for the organisms living in water.
(2) 2/3rd of world's photosynthesis is done by green algae in which large amount of oxygen is released.
(3) An important product agar-agar is obtained from red algae. It is used in laboratories and preparation of cosmetics medicines and food.
(4) An algae, kelp, is an important source of Iodine.
(5) Diatoms are the rich source of silica.

30. Name the three groups of algae. How are they different from each other?

Ans. On the bases of pigment, algae are classified into three types:

- (i) **Green algae.** They contain only a green pigment called chlorophyll, e.g., *Chlorella*, *Spirogyra*, *Volvox*.
- (ii) **Brown algae.** They contain a brown pigment along with chlorophyll, e.g. *Laminaria*, *Fucus*.
- (iii) **Red algae.** They contain red and blue pigments along with chlorophyll, e.g. *Chondrus*.

31. List the three main groups of fungi. Give one example of each group.

Ans. Fungi are divided into three groups:

- (i) **Thread-like fungi**, e.g., Bread mould.
- (ii) **Sac fungi**, e.g., Mushroom.
- (iii) **Club fungi**, e.g., Yeast.

32. Viruses behave like living as well as non-living things. Describe its non-living characteristics and its living characteristics.

Ans. Viruses are the connecting link between living and non-living things. Viruses have the characteristics of both living and non-living things. Viruses are not considered to be organisms because they do not have cellular organisation. They have no real life outside the cell and can be stored in the crystal forms. When a virus enters in a host cell, it becomes functional and show all the activities of a living cell.

Thus, viruses are obligate parasites. And this relationship between host and organisms is called parasitism as virus benefits and the host is harmed.

33. On testing the water of a river you find it contains *E.coli*. What do you conclude about the water?

Ans. *E. coli* is a rod-shaped bacteria and present in the alimentary canal of human and other vertebrates. If we find *E. Coli* on testing the water of a river then it means this river is polluted with the faecal matter of humans and other vertebrates.
