

CHAPTER - 2

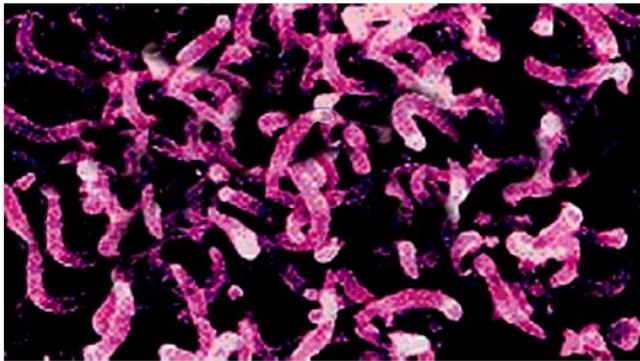
MICROORGANISMS : FRIEND AND FOE

MICROORGANISMS

An organism which cannot be seen by naked eyes is called microorganism or microbe. We need a microscope to see a microbe. The microorganisms or microbes are so small in size that they cannot be seen with the unaided eye. Some of these, such as the fungus that grows on bread, can be seen with a magnifying glass. Others cannot be seen without the help of a microscope. That is why these are called microorganisms or microbes.

TYPES OF MICROORGANISMS

Bacteria: Bacteria are microscopic organisms which have cell walls but do not have nucleus. Some bacteria are autotrophs but most are heterotrophs. Bacteria are found in different shapes; like rod-shaped, spiral, spherical and comma-shaped. Examples: Rhizobium, E. coli, Pseudomonas, Streptococcus, etc.



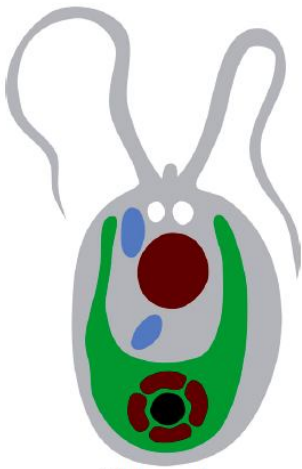
Spiral bacteria



Rod shaped bacteria

Bacteria

Algae: Algae are green plants which are simple in structure. A cell of algae contains cell wall and chloroplast. Algae are autotrophs. Some algae are microscopic. Examples: Chlamydomonas, Spirogyra, etc.

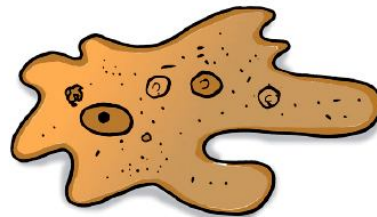


Chlamydomonas

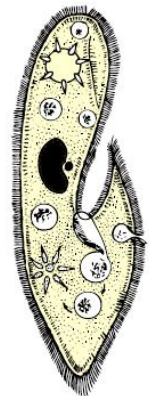


Spirogyra

Algae



Amoeba

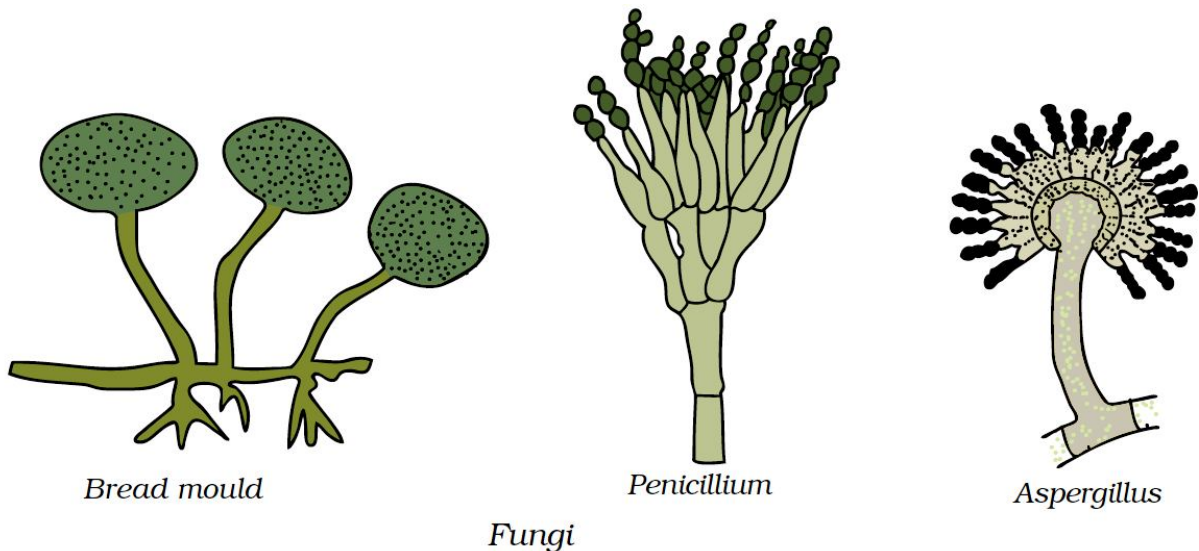


Paramecium

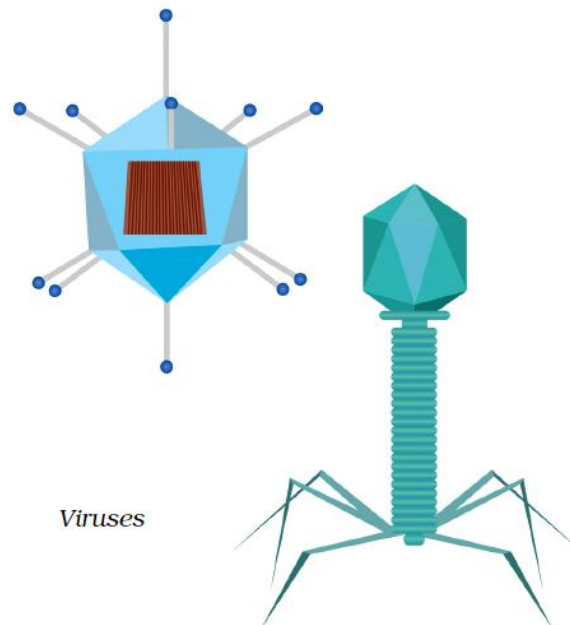
Protozoa

Protozoa: Protozoa do not have cell wall and chloroplast but they do have nucleus. These are unicellular microscopic organisms similar to animals that can move about to capture food and are heterotrophic in nature. They are mostly aquatic in nature. Amoeba, paramecium are some examples of protozoa.

Fungi: Fungi have cell wall and nucleus in their cells but do not have chloroplast. Fungi are saprotrophs, i.e. they feed on dead remains of plants and animals. Almost all fungi are microscopic, except mushrooms. Examples: yeast, Rhizopus (bread mould), Aspergillus, Penicillium, etc.



Virus: Viruses are also microscopic but they are not considered as living beings. They are considered as a borderline case between living and non-living. A virus behaves as non-living when it is outside a host cell, i.e. a virus does not carry on nutrition, respiration or reproduction when it is outside a host. But once it is inside a host, it behaves like a living being, i.e. it carries on nutrition, respiration and reproduction when it is inside a host. Examples: HIV, Tobacco Mosaic Virus (TMV), etc.



HABITAT OF MICROORGANISMS

Microorganisms may be single-celled like bacteria, some algae and protozoa, or multicellular, such as algae and fungi. They can survive under all types of environment, ranging from ice cold climate to hot springs and deserts to marshy lands. They are also found inside the bodies of animals including humans. Some microorganisms grow on other organisms while others exist

freely. Microorganisms like amoeba can live alone, while fungi and bacteria may live in colonies.

FRIENDLY MICROORGANISMS

- Microorganisms are used for various purposes. They are used in the preparation of curd, bread and cake.
- Curd contains several microorganisms. Of these, the bacterium *Lactobacillus* promotes the formation of curd. It multiplies in milk and converts it into curd. Bacteria are also involved in the making of cheese, pickles and many other food items.
- Yeast causes fermentation of many food items. The process by which sugar solution changes into alcohol due to anaerobic respiration by microbes is called **fermentation**.
- When yeast is added to batter of cake, idli or pakora, there is production of carbon dioxide due to respiration by yeast. Carbon dioxide gas creates bubbles in dough or batter which makes fluffy cakes, breads, idli and dosa.
- Fermentation also helps in production of alcohol from fruit juice, sugar cane juice or from cereals. This process is utilized to make wine, beer and other alcohol products.

MEDICINAL USE OF MICROORGANISMS

Antibiotic

A substance which kills or stops the growth of bacteria is called antibiotic.

Alexander Fleming discovered the antibiotic Penicillin in 1929. During one of his experiments; Alexander Fleming observed that bacteria did not grow on culture where a fungus (*Penicillium notatum*) was present. Thus, penicillin was prepared from a fungus *Penicillium*. Penicillin made it possible to treat many difficult diseases. Most of the modern antibiotics are derivatives of penicillin, e.g. amoxycillin, cefotaxime, cefoperazone, cefuroxime, ceftazidime, etc. Some other examples of antibiotics are; tetracycline, norfloxacin, ciprofloxacin, doxycycline, etc.

Vaccine

Our body has the ability to fight diseases. The defence-mechanism of our body produces antibodies to fight a disease-causing microbe which may enter our body. While doing so, our body remembers to fight any future onslaught of that microbe. This concept was utilized to make vaccines against various diseases.

A vaccine made by a weak or killed strain of a disease-causing microbe. When a vaccine is inoculated in the body, the body prepares antibodies against it. Thus, the body learns and remembers how to fight with that microbe in future. Thus, vaccination helps in preventing against a particular disease.

Edward Jenner discovered small pox vaccine in 1798. He observed that people who were rearing cows did not suffer from small pox. That observation led to the discovery of small pox vaccine.

Vaccines are now available for many diseases; like small pox, tuberculosis, polio, tetanus, diphtheria, whooping cough, hepatitis, etc.

Pulse Polio

Polio: Polio is a viral disease which damages the nerves in spine. This results in weak muscles and paralysis; especially in legs. Polio is also called infantile paralysis. Polio vaccine can prevent this disease.

Pulse Polio is a large scale programme to eradicate polio from India. This programme is being run by the United Nations; in coordination with the Government of India. All children under five years of age are given polio drops; under this programme. Pulse Polio has been highly successful against eradication of polio.

Increasing Soil Fertility

Blue-green algae fix atmospheric nitrogen in soil. Rhizobium bacteria live in root nodules of leguminous plants. These bacteria also help in nitrogen fixation in soil. Thus, these microbes help in improving soil fertility.

Cleaning the Environment

Many microbes feed on dead remains of plants and animals. Thus, these microbes play the role of decomposers. Thus, microbes help in clearing organic waste from our surroundings. Dead cattle, waste from meat and fish shop, waste from vegetable market, etc. are decomposed because of microbes.

HARMFUL MICROORGANISMS

Microorganisms are harmful in many ways. Some of the microorganisms cause diseases in human beings, plants and animals. Such disease-causing microorganisms are called pathogens. Some microorganisms spoil food, clothing and leather. Pathogens enter our body through the air we breathe, the water we drink or the food we eat. They can also get transmitted by direct contact with an infected person or carried through an animal.

Communicable Disease: A disease which can spread from one person to another is called communicable disease. These are microbial diseases that can spread from an infected person to a healthy person through air, water, food or physical contact. Examples of such diseases include cholera, common cold, chicken pox and tuberculosis.

Infectious Disease: A disease which is caused by an attack from microbes is called infectious disease.

Pathogen: A microbe which causes disease is called a pathogen. Some examples of pathogens are as follows:

Pathogen	Disease	Mode of Transmission
Plasmodium	Malaria	Spreads through bite of female Anopheles mosquito.
Dengue virus	Dengue	Spreads through bite of Aedes mosquito.
Common cold virus	Common cold	Through air; when someone coughs or sneezes.
Many bacteria	Cholera, diarrhoea	Through contaminated food and water.
Hepatitis B virus	Hepatitis B	Through exchange body fluids.
HIV	AIDS	Through exchange of body fluids.
Bacillus anthracis	Anthrax (in animals)	Through contact.

CARRIERS OF DISEASE-CAUSING MICRO-ORGANISMS

There are some insects in our environment which transfer disease—causing microbes into our body (either by contaminating our food or by biting into our body), and spread diseases. The two most common insects which carry disease-causing micro—organisms (microbes or pathogens) are the housefly and mosquito. The insect (or other animal) which transmits disease-causing micro-organisms to humans (without itself suffering from them) is called a ‘**carrier**’.

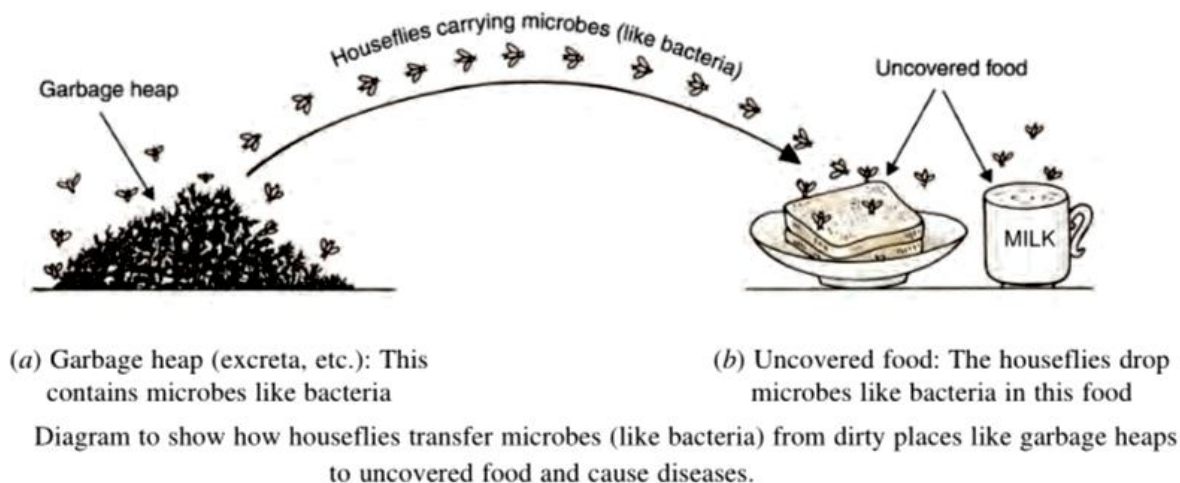
There are some insects and animals which act as carriers of disease-causing microbes. The two most common carriers of disease-causing micro-organisms (or microbes) are :

- (i) Housefly, and
- (ii) Mosquito.

The Role of Housefly in Spreading Diseases

When the housefly sits on a garbage heap, human excreta or other filth and refuse, then millions of disease-causing micro-organisms (like bacteria) present in them stick to the hairy legs and other body parts of the housefly [see Figure (a)]. And when this housefly now sits on our uncovered food, then the micro-organisms sticking to the hair on its legs and other body parts are transferred to food [see Figure (b)]. In this way our food gets contaminated with disease-causing micro-organisms. When this contaminated food is consumed by a person, then the disease-causing micro-organisms enter into his

body and cause various diseases. The person gets sick. Thus, the housefly carries disease-causing micro-organisms (or germs) on the hair of its legs and other body parts.



Prevention of Diseases Spread by Houseflies

The spreading of diseases by houseflies can be prevented in the following ways

- We should not leave household garbage here and there. The garbage should be put in the garbage bins which should be kept covered. This will prevent the houseflies from breeding because they will not be able to lay their eggs on garbage.
- The food should always be kept covered so that flies cannot sit on it.
- We should avoid eating uncovered food items from the road-side stalls.
- The flies should be killed by using insecticide spray and baits.
- Some of the diseases spread by houseflies can be prevented by vaccination.

Role of Mosquitoes in Spreading Diseases

Mosquito is another insect which spreads diseases by transmitting disease-causing micro-organisms (or microbes). Mosquito acts as a carrier of disease-causing micro-organisms and spreads diseases from one person to another.

Please note that housefly carries the disease-causing microbes on the hair (outside its

body) but the mosquito carries microbes inside its body. Mosquitoes breed in stagnant water of ponds, dirty drains, pools, ditches, and shallow lakes, etc.

The most common disease spread by mosquitoes is ‘malaria’. Actually, it is the female Anopheles mosquito which carries the parasite of malaria. Female Aedes mosquito acts as carrier of dengue virus.

How to prevent Malaria and Dengue:

- Malaria and dengue spread through mosquitoes. So, breeding of mosquito should be prevented.
- Don't allow water to stagnate in surroundings because mosquitoes lay eggs in stagnant water.
- Frequently clean the water in cooler.
- Keep the overhead tank covered.
- Keep the drains properly covered.
- Fill any ditch with sand or soil.
- Use mosquito repellent creams and mosquito nets to prevent mosquito bite.

Disease— causing Microorganisms in Animals

Several microorganisms not only cause diseases in humans and plants, but also in other animals. For example, anthrax is a dangerous human and cattle disease caused by a bacterium. Foot and mouth disease of cattle is caused by a virus.

Disease— causing Microorganisms in Plants

Several microorganisms cause diseases in plants like wheat, rice, potato, sugarcane, orange, apple and others. The diseases reduce the yield of crops. See the below table for some such plant diseases. They can be controlled by the use of certain chemicals which kill the microbes.

Diseases caused by microbes in plants		
Microbes	Disease	Mode of transmission
Bacteria	Citrus canker	Air
Fungi	Rust of wheat	Air, seeds
Virus	Yellow vein mosaic of Okra	Insects

Food Poisoning

Some bacteria produce a toxic substance in food. Consuming a food item with toxic substance can result in food poisoning. Food poisoning is a serious case and needs immediate hospitalization. Lack of timely care in case of food poisoning may prove fatal.

Food Preservation

Techniques to prolong the shelf life of a food are called **food preservation**. We know that microbes proliferate very fast in presence of food, moisture, oxygen and ambient temperature. All the methods of food preservation are aimed at ruling out the food, moisture, oxygen and ambient temperature for microbes so that they won't proliferate. Some common methods of food preservation are as follows:

Sun Drying: This is a traditional method of food preservation. Sun-drying helps in removing moisture from food. Grains are dried in sun before being stored. Many vegetables are also sun-dried so that they can be used in off season.

Chemical Method: Some chemicals prevent the growth of microorganisms in food. These chemicals are used in pickles and jams to preserve them. Salt, acids and oil are also used as food preservatives. Examples: sodium benzoate and sodium metabisulphate.

Preservation by common salt: When a food item is kept in plenty of salt, water from food comes out because of osmosis. It results in dehydration of the food item. Absence of moisture helps to prevent the growth of microbes. Fish, meat and pickles are preserved by adding salt.

Preservation by Sugar: Sugar preserves food by reducing moisture in food. Jam, jelly and squash are preserved by adding sugar.

Preservation by Oil and Vinegar: The layer of oil on top of food prevents oxygen from entering the food. Some microbes do not survive in absence of oxygen. Some microbes cannot survive in acidic environment and thus vinegar is an effective food preservative.

Heat and Cold Treatment: Most of the organisms can survive within a particular range of temperature. When the temperature becomes too low or too high, organisms cannot survive. Heating a food item or freezing a food items thus helps in preservation. In most of the households, milk is boiled twice or thrice in a day to prolong its shelf life. Milk is pasteurized before being packed. Pasteurization involves heating the milk to 70°C for about 15 to 30 minutes and is then quickly cooling down the milk. Pasteurization helps in killing the microbes which may be present in milk. Most of the organisms can survive within a particular range of temperature. When the temperature becomes too low or too high, organisms cannot survive. Heating a food item or freezing a food items thus helps in preservation. In most of the households, milk is boiled twice or thrice in a day to prolong its shelf life. Milk is pasteurized before being packed. Pasteurization involves heating the milk to 70°C for about 15 to 30 minutes and is then quickly cooling down the milk. Pasteurization helps in killing the microbes which may be present in milk.

Storage and Packing: Some food items are stored in air-tight packets so that oxygen is not available for proliferation of microbes. Some food items are packed in cans; along with some preservatives. Oily food; such as potato chips; is packed in air-tight packets which are filled with nitrogen gas. Nitrogen gas prevents the oily food from becoming rancid.

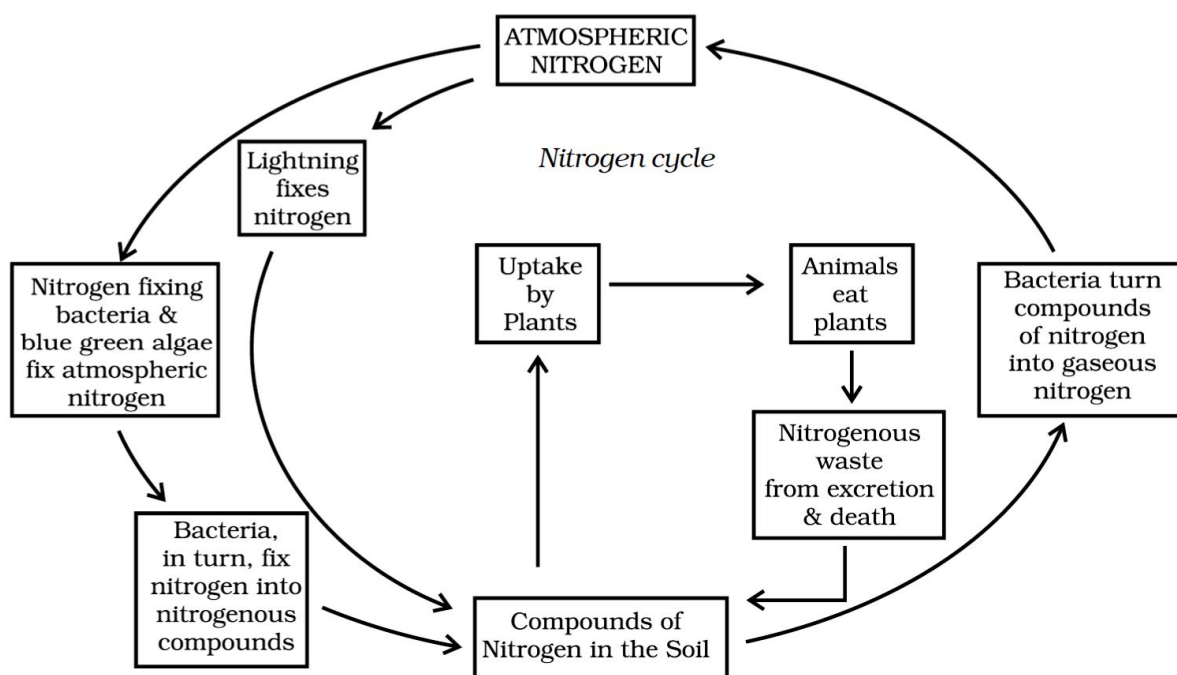
NITROGEN FIXATION

78% of atmosphere is composed of nitrogen. But green plants cannot utilize gaseous nitrogen. Gaseous nitrogen needs to be converted into compounds of nitrogen so that plants can utilize nitrogen.

The process of converting nitrogen into compounds which can be taken up by green plants is called **nitrogen fixation**. Following are the main steps of nitrogen fixation:

- Blue green algae and some bacteria (like Rhizobium) convert gaseous nitrogen into compounds of nitrogen. Such nitrogenous compounds get deposited in soil.
- During lighting, some of the nitrogen in atmosphere gets converted into compounds of nitrogen. Such nitrogenous compounds reach the soil along with rainwater.
- Green plants absorb nitrogenous compounds from soil. Plants make protein and various other important molecules from nitrogen. Nitrogen reaches the body of other organisms through food chain.
- A major portion of nitrogen from animals and plants is removed during excretion. Remaining portion of nitrogen is sent back to the environment when dead animals and plants get decomposed.

Nitrogen Cycle: The cycle of events by which nitrogen is channelized into the living world and back to atmosphere is called nitrogen cycle.



NCERT EXERCISE QUESTIONS AND ANSWERS

1. Fill in the blanks:

- Microorganisms can be seen with the help of a _____.
- Blue green algae fix _____ directly from air to enhance fertility of soil.
- Alcohol is produced with the help of _____.
- Cholera is caused by _____.

Answer: (a) microscope, (b) nitrogen, (c) yeast, (d) bacteria

2. Tick the correct answer:

- Yeast is used in the production of
(i) sugar (ii) alcohol (iii) hydrochloric acid (iv) oxygen

Answer: (ii) alcohol

- The following is an antibiotic
(i) Sodium bicarbonate (ii) Streptomycin (iii) Alcohol (iv) Yeast

Answer: (ii) Streptomycin

- Carrier of malaria-causing protozoan is
(i) female Anopheles mosquito (ii) cockroach
(iii) housefly (iv) butterfly

Answer: (i) Female Anopheles mosquito

- The most common carrier of communicable diseases is
(i) ant (ii) housefly (iii) dragonfly (iv) spider

Answer: (ii) housefly

- The bread or idli dough rises because of
(i) heat (ii) grinding (iii) growth of yeast cells (iv) kneading

Answer: (iii) Growth of yeast cells

- (f) The process of conversion of sugar into alcohol is called
(i) nitrogen fixation (ii) moulding (iii) fermentation (iv) infection
Answer: (iii) Fermentation

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	(d) Causing Malaria
(v) A protozoan	(e) Causing Cholera
(vi) A Virus	(f) Causing AIDS
	(g) Producing antibodies

Answer:

Column I	Column II
(i) Bacteria	(e) Causing Cholera
(ii) Rhizobium	(a) Fixing Nitrogen
(iii) Lactobacillus	(b) Setting of curd
(iv) Yeast	(c) Baking of bread
(v) A protozoan	(d) Causing Malaria
(vi) A Virus	(f) Causing AIDS

4. Can microorganisms be seen with the naked eye? If not, how can they be seen?

Answer: No, we cannot see the microorganisms with the naked eye. Such organisms can be seen through microscope.

5. What are the major groups of microorganisms?

Answer: The major groups of microorganisms are: bacteria, algae, fungi and protozoa

6. Name the microorganisms which can fix atmospheric nitrogen in the soil.

Answer: Rhizobium, Blue-green algae

7. Write 10 lines on the usefulness of microorganisms in our lives.

Answer:

Usefulness of microorganisms:

- 1) Lactobacillus helps in making curd from milk.
- 2) Yeast helps in rising of dough and batter while making various food items.
- 3) Yeast helps in fermentation and thus in production of wine.
- 4) Antibiotics are made from microbes.
- 5) Microbes help in cleaning the environment by decomposing dead remains of plants and animals.
- 6) Microbes help in nitrogen fixation in soil.
- 7) Some microbes in our digestive system help in digestion of food.
- 8) Weak strains of some microbes are utilized to make vaccine against diseases.
- 9) Microbes help in making of compost.
- 10) Lactobacillus (present in curd) is beneficial for our health.

8. Write a short paragraph on the harms caused by microorganisms.

Answer: Many microorganisms are harmful for us. Some microbes enter our body and cause diseases. Some of the infectious diseases can be highly debilitating in nature. Some microbes infect cattle and poultry and thus cause heavy loss to us. Some microbes damage the crops. Microbes also spoil our food. For example; fruits, vegetables, meat, fish, milk, etc. can easily get spoiled due to microbes.

9. What are antibiotics? What precautions must be taken while taking antibiotics?

Answer: A substance which kills or stops the growth of bacteria is called antibiotic. Following precautions need to be taken while taking antibiotics:

- Always follow a doctor's prescription while taking an antibiotic.
- Never take an antibiotic without consulting a doctor.
- Always complete the prescribed dose of antibiotic. Don't stop taking an antibiotic in between.
- Keep antibiotics away from children.
- Never use an antibiotic which is past its expiry date.

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QUESTION BANK (SET 01)

1. Which microbe is used for production of alcohol?
(a) Yeast (b) Plasmodium (c) Lactobacillus (d) Rhizobium
2. How much nitrogen is present in the atmosphere?
(a) 78% (b) 88% (c) 68% (d) 58%
3. Malaria is caused by which type of microbe?
(a) Bacteria (b) Fungi (c) Algae (d) Protozoa
4. Common cold is caused by which type of microbe?
(a) Bacteria (b) Virus (c) Algae (d) Fungi
5. Which of the following diseases is caused by a fungus?
(a) Cholera (b) Common cold (c) Ringworm (d) Dengue
6. Which of the following helps in making curd from milk?
(a) Lactobacillus (b) Plasmodium (c) Yeast (d) Salmonella
7. Antibiotics are effective against which of the following?
(a) Bacteria (b) Fungi (c) Virus (d) All of the above
8. Penicillin was discovered by which scientist?
(a) Edward Jenner (b) Louis Pasteur (c) Alexander Fleming (d) Robert Koch
9. The bread dough rises because of:
(a) heat (b) grinding (c) growth of yeast cells (d) kneading
10. Yeast is used in the production of:
(a) sugar (b) alcohol (c) hydrochloric acid (d) oxygen
11. The process of conversion of sugar into alcohol is called :
(a) nitrogen fixation (b) moulding (c) fermentation (d) infection
12. Which of the following is an antibiotic?
(a) sodium bicarbonate (b) streptomycin (c) alcohol (d) yeast
13. The most common carrier of communicable diseases is :
(a) ant (b) housefly (c) dragonfly (d) spider
14. The carrier of malaria-causing protozoan is :
(a) female Anopheles mosquito (b) cockroach
(c) housefly (d) female Aedes mosquito
15. The vaccine for smallpox was discovered by :
(a) Alexander Fleming (b) Edward Jenner
(c) Louis Pasteur (d) Robert Koch
16. Alcohol can be converted into vinegar by the action of micro-organisms called :
(a) viruses (b) yeast (c) protozoa (d) bacteria

17. The first antibiotic called penicillin was extracted from :
(a) a bacterium (b) a protozoan (c) a fungus (d) an alga
18. Which of the following is not a communicable disease?
(a) cholera (b) cancer (c) chickenpox (d) malaria
19. Which of the following increase the fertility of soil?
A. Lactobacillus bacteria B. Rhizobium bacteria
C. Spirogyra algae D. Blue-green algae
(a) A and B (b) B and C (c) A and D (d) B and D
20. Which of the following cannot be used as a food preservative?
(a) sodium metabisulphite (b) sodium hydroxide
(c) sodium benzoate (d) citric acid
21. Which of the following disease is not caused by bacteria?
(a) cholera (b) typhoid (c) tuberculosis (d) measles
22. The micro-organisms which can reproduce and multiply only inside the cells of other organisms are :
(a) protozoa (b) fungi (c) bacteria (d) viruses
23. The dengue disease spread by Aedes mosquito is caused by :
(a) bacteria (b) virus (c) protozoan (d) fungus
24. Which of the following disease is not caused by viruses?
(a) measles (b) smallpox (c) cholera (d) polio
25. The microorganism which is capable of converting sugar into alcohol and carbon dioxide is:
(a) bacterium (b) fungus (c) alga (d) protozoan
26. Which of the following is not a use of micro—organisms?
(a) preparation of medicines (or drugs) (b) preparation of food by photosynthesis
(c) recycling of materials in nature (d) increasing the fertility of soil
27. The malaria disease is caused by a :
(a) virus (b) protozoan (c) bacterium (d) fungus
28. The parasite called Plasmodium causes a disease known as :
(a) measles (b) polio (c) malaria (d) dengue
29. How do viruses differ from other micro-organisms such as bacteria?
30. Can micro—organisms be seen with the naked eye? If not, how can they be seen?
31. (a) How do houseflies carry disease-causing microbes (or pathogens)?
(b) State any two ways of preventing diseases spread by houseflies.
32. (a) How do mosquitoes carry disease-causing micro-organisms and spread diseases?
(b) Mention any three ways of preventing diseases spread by mosquitoes.
33. (a) What is meant by fermentation? Name the scientist who discovered fermentation.
(b) Which micro-organism converts sugar into alcohol during fermentation?
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34. (a) How do micro-organisms help in increasing soil fertility?
(b) How do micro-organisms help in cleaning the environment?
35. Why are antibiotics not effective against ‘common cold’ and ‘flu’?
36. What is the full form of HIV? Name the disease caused by HIV.
37. Describe how, curd is made from milk. Name the bacterium which converts milk into curd.
38. Name the micro-organism used in bread-making which makes the bread-dough rise. How does it make the dough rise?
39. What is food poisoning? How is food poisoning caused?
40. (a) What is meant by food preservation? Name any five methods of preserving food.
(b) How do you preserve cooked food at home?
41. (a) Why should we not let water collect anywhere in the neighbourhood?
(b) Name one animal disease each caused : (i) by virus (ii) by bacteria (iii) by fungus.
42. Where do Rhizobium bacteria live? What is their function?
43. State the beneficial effects (or usefulness) of micro—organisms in our lives.
44. Describe the method of pasteurization for the preservation of milk.
45. (a) What is a vaccine? How does a vaccine work?
(b) Why are children given vaccination?
46. What is meant by ‘nitrogen fixation’? State two ways in which nitrogen gas of the atmosphere can be ‘fixed’ in nature to get nitrogen compounds in the soil.
47. (a) What is meant by communicable diseases? Name any two communicable diseases.
48. (b) What are the various ways in which communicable diseases can occur and spread?
49. (a) Name any five human diseases caused by micro-organisms. Also name the causative micro-organisms and mode of transmission for each of these diseases.
(b) State the various ways of preventing the occurrence and spreading of communicable diseases.
50. Draw a neat, labelled diagram of nitrogen cycle in nature. Which natural phenomenon occurring in the sky is responsible for nitrogen fixation?
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QUESTION BANK (SET 02)

1. Fill in the following blanks with suitable words:

- (a) Alcohol is produced with the help of
- (b) Blue-green algae fix.....directly from air to enhance fertility of soil.
- (c) Micro-organisms can be seen with help of a.....
- (d) Cholera is caused by.....
- (e) Common salt has been used to preserve..... and for ages.
- (f) The food material which is preserved by pasteurization is
- (g) As a result of nitrogen cycle, the percentage of nitrogen in the atmosphere remains more or less.....

Answer: (a) yeast

- (b) nitrogen
- (c) microscope
- (d) bacteria
- (e) meat; fish
- (f) milk
- (g) constant

2. Name the instrument (or device) which is needed to see the micro-organisms.

Answer: Microscope is needed to see the micro-organisms.

3. What is the name of micro-organisms which reproduce only inside the living cells of other organisms?

Answer: Viruses are the smallest micro-organisms which reproduce only inside the living cells of other organisms.

4. What are the major groups of micro-organisms?

Answer: There are five major groups of micro-organisms. These are: Bacteria, viruses, Protozoa, some fungi and Algae.

5. Name any two human diseases caused by bacteria.

Answer: Typhoid and Cholera are caused by bacteria in human beings.

6. Name any two human diseases caused by viruses.

Answer: The human diseases such as common cold and influenza are caused by viruses.

7. Name any two human diseases caused by protozoa.

Answer: The human diseases amoebic dysentery and malaria are caused by protozoans.

8. Name any two human diseases caused by fungi.

Answer: Diseases athlete's foot and ring worm are caused by fungi.

9. Which micro-organism is utilized in making curd from milk?

Answer: Lactobacillus bacterium is utilized in making curd from milk.

10. Name the -micro-organism which is used for the large scale production of alcohol.

Answer: Yeast is used for the large-scale production of alcohol.

11. Name any two antibiotics.

Answer: Streptomycin and erythromycin are two commonly known antibiotics which are made from fungi and bacteria.

- 12.** Name an antibiotic extracted from fungus (mould). Name the fungus.
Answer: An antibiotic Penicillin was extracted from fungus (mould) by Alexander Fleming in 1929. This antibiotic was made from the fungus called penicillium.
- 13.** Name any four diseases which can be prevented by vaccination.
Answer: Several diseases including tuberculosis, smallpox, cholera and hepatitis can be prevented by vaccination.
- 14.** Name the scientist who discovered the-vaccine for smallpox.
Answer: Edward Jenner discovered the vaccine for smallpox in 1778.
- 15.** Name the scientist who discovered 'penicillin'.
Answer: Alexander Fleming discovered the antibiotic "Penicillin" in 1929.
- 16.** State an important function performed by blue-green algae.
Answer: Blue green algae fix the atmospheric nitrogen to enrich soil with nitrogen and hence, increase soil fertility.
- 17.** Name one 'biological nitrogen-fixer'.
Answer: Blue green algae are known as 'biological nitrogen-fixer' as they fix the atmospheric nitrogen.
- 18.** Name two common insects which act as carriers of disease-causing micro-organisms (or disease-causing microbes).
Answer: The two common insects which act as carriers of disease-causing micro-organisms (or disease-causing microbes) are housefly and mosquito.
- 19.** Name any two diseases spread by housefly.
Answer: Diseases cholera and tuberculosis spread by housefly.
- 20.** Name the insect which is the carrier of parasite of malaria.
Answer: The carrier of parasite of malaria is Female Anopheles mosquito.
- 21.** Name the insect which carries dengue virus.
Answer: Female Aedes mosquito carries dengue virus.
- 22.** Which of the two spreads dengue: mosquito or housefly?
Answer: Female Aedes mosquito acts as a carrier of dengue virus.
- 23.** Name the microbe which causes malaria disease.
Answer: Protozoa Plasmodium causes malaria disease.
- 24.** Name one disease which spreads by breathing in air containing micro-organisms.
Answer: Tuberculosis disease spreads by breathing in air containing micro-organisms.
- 25.** Name one disease which spreads through infected food or water.
Answer: Cholera disease spreads through infected food or water.
- 26.** Name the causative micro-organisms of the following animal diseases:
(a) Foot and mouth disease (b) Anthrax
Answer: (a) Foot and mouth disease is caused by a virus.
(b) Anthrax disease is caused by a bacterium.
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- 27.** Name two food materials which are preserved by sun-drying method in our homes.
Answer: Vegetables like methi leaves and spinach are preserved by sun-drying method in our homes.
- 28.** Name two food materials which are preserved by using common salt.
Answer: Meat and fish are preserved by using common salt.
- 29.** Name two food materials which can be preserved by using sugar.
Answer: Jams and jellies are preserved by using sugar.
- 30.** Name two food materials which are usually preserved by deep freezing.
Answer: Preservation by deep freezing means preservation of food material in the extreme cold. Low temperature inhibits the growth of micro-organisms completely. Food materials such meat and fish are usually preserved by deep freezing.
- 31.** Name some of the preservatives which are used in the preservation of fruits as jams and jellies.
Answer: Sodium benzoate and sodium meta bisulphite are common preservatives which are used in the preservation of fruits as jams and jellies.
- 32.** Name some of the preservatives which are used in the preservation of fruits and vegetables as pickles.
Answer: Salt, oil and vinegar are some of the preservatives which are used in the preservation of fruits and vegetables as pickles.
- 33.** Name two food materials which can be preserved by using oil or vinegar.
Answer: Fish and meat are often preserved by using oil or vinegar.
- 34.** Name any two special chemicals which are used as food preservatives.
Answer: Sodium benzoate and sodium metabisulphite are common preservatives.
- 35.** Name the micro-organisms which can fix atmospheric nitrogen in the soil.
Answer: Certain bacteria and blue green algae present in the soil fix atmospheric nitrogen and convert it into compounds of nitrogen.
- 36.** What type of plants can fix nitrogen gas of the air into compounds of nitrogen?
Answer: Leguminous plants can fix atmospheric nitrogen into nitrogen compounds.
- 37.** Name the micro-organisms present in the soil and in the root nodules of leguminous plants which can fix atmospheric nitrogen.
Answer: Some bacteria and blue green algae present in the soil and rhizobium present in the root nodules of leguminous plants can fix atmospheric nitrogen.
- 38.** Name two leguminous plants which can fix nitrogen.
Answer: Leguminous plants such as beans and peas can fix nitrogen.
- 39.** What are microorganisms?
Answer: Organisms which cannot be seen by naked eyes are called microorganisms or microbes.
- 40.** What is an antibiotic?
Answer: A substance which kills or stops the growth of bacteria is called antibiotic.
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41. What is fermentation?

Answer: The process of conversion of sugar into alcohol by yeast through anaerobic respiration is called fermentation.

42. What is Polio?

Answer: Polio is a disease which affects nerves and results in paralysis; especially of legs.

43. What is communicable disease?

Answer: A disease which can spread from one person to another is called communicable disease.

44. What is a pathogen?

Answer: A microorganism which causes disease is called a pathogen.

45. What is food preservation?

Answer: Use of some techniques to prolong the shelf life of a food is called food preservation.

46. What is nitrogen fixation?

Answer: The process of changing atmospheric nitrogen into compounds of nitrogen so that plants can take up nitrogen is called nitrogen fixation.

47. What is nitrogen cycle?

Answer: The sequence of events by which nitrogen is channelized to the living world and back to atmosphere is called nitrogen cycle.

48. Write a short note on bacteria.

Answer: Bacteria are microscopic organisms which have cell walls but do not have nucleus. Some bacteria are autotrophs but most are heterotrophs. Bacteria are found in different shapes; like rod-shaped, spiral, spherical and comma-shaped. Examples: Rhizobium, E. coli, Pseudomonas, Streptococcus, etc.

49. What are viruses?

Answer: Viruses are also microscopic but they are not considered as living beings. They are considered as a borderline case between living and non-living. A virus behaves as non-living when it is outside a host cell, i.e. a virus does not carry on nutrition, respiration or reproduction when it is outside a host. But once it is inside a host, it behaves like a living being, i.e. it carries on nutrition, respiration and reproduction when it is inside a host. Examples: HIV, Tobacco Mosaic Virus (TMV), etc.

50. What is a vaccine? How does it work?

Answer: A vaccine made by a weak or killed strain of a disease-causing microbe. When a vaccine is inoculated in the body, the body prepares antibodies against it. Thus, the body learns and remembers how to fight with that microbe in future. Thus, vaccination helps in preventing against a particular disease.

51. How do the microbes help in cleaning the environment?

Answer: Many microbes feed on dead remains of plants and animals. Thus, these microbes play the role of decomposers. Thus, microbes help in clearing organic waste from our surroundings. Dead cattle, waste from meat and fish shop, waste from vegetable market, etc. are decomposed because of microbes.

52. What do you understand by food poisoning?

Answer: Some bacteria produce a toxic substance in food. Consuming a food item with toxic substance can result in food poisoning. Food poisoning is a serious case and needs immediate hospitalization. Lack of timely care in case of food poisoning may prove fatal.

53. How does salt help in food preservation?

Answer: When a food item is kept in plenty of salt, water from food comes out because of osmosis. It results in dehydration of the food item. Absence of moisture helps to prevent the growth of microbes. Fish, meat and pickles are preserved by adding salt.

54. What do you understand by pasteurization?

Answer: Pasteurization is a method of food preservation. Milk is pasteurized before being packed. Pasteurization involves heating the milk to 70°C for about 15 to 30 minutes and is then quickly cooling down the milk. Pasteurization helps in killing the microbes which may be present in milk.

55. Explain chemical method of food preservation.

Answer: Some chemicals prevent the growth of microorganisms in food. These chemicals are used in pickles and jams to preserve them. Salt, acids and oil are also used as food preservatives. Examples: sodium benzoate and sodium metabisulphate.

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