Microorganisms: Friend and Foe

Case study 1

You have seen several kinds of plants and animals. However,there are other living organisms around us which we normally cannotsee. These are called microorganisms or microbes. For example, you might have observed that during the rainy season moist bread gets spoiled and its surface gets covered with grayish white patches. Observe these patches through a magnifying glass. You will see tiny,black rounded structures. Do you know what these structures are and where do these come from? Waterand soil are full of tiny organisms,though not all of them fall into the category of microbes.These micro organisms 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.Microorganisms are classified into four major groups. These groups are bacteria, fungi, protozoa and some algae. Viruses are also microscopic but are different from other microorganisms.They, however, reproduce only inside the cells of the host organism, which may be a bacterium, plant or animal. Common Ailments like cold, influenza (flu) and most coughs are caused by viruses.Serious diseases like polio and chickenpox are also caused by viruses.Diseases like dysentery and malaria are caused by protozoa(protozoans)whereas typhoid and tuberculosis (TB)are bacterial diseases.You have learnt about some of these microorganisms in Classes VIand VII.Microorganisms may be single-cells like bacteria, some algae and protozoa,or multicellular, such as many algae and fungi. They live in all types of environments, 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.

Que. 1) …… only reproduce inside the cells of host organisms like bacteria, plants or animals.
(a) Microbes. (b) Viruses
(c) Spores. (d) Bacillus

Que. 2) Which among the following is an example of disease caused by bacteria?
(a) Flu. (b) Malaria
(c) Tuberculosis. (d) Covid 19

Que. 3) During rainy season moist bread gets spoilt and are covered with greyish white patches. What are these greyish white patches?
(a) Bacteria. (b) Viruses
(c) Dirt. (d) Fungus

Que. 4) Define microorganisms and state its major groups of classification.

Que. 5) Explain in detail where are microorganisms commonly found.

Answer Key

Que. 1) (b) Viruses

Que. 2) (c) Tuberculosis

Que. 3) (d) Fungus

Que. 4) Answer: Microorganisms are tiny living organisms that cannot be seen with our naked eyes. Microorganisms are classified into four major groups namely bacteria, fungi, protozoa and some algae.

Que. 5) Answer: Microorganisms are present in all types of environments ranging from ice cold climate to hot springs, deserts and marshy lands. They can also be seen inside the bodies of animals. Some microorganisms exist freely and some grow on other organisms.

Case study 2

Microorganisms are used for various purposes. They are used in the preparation of curd, bread and cake.Microorganisms have been used for the production of alcohol since ages.They are also used in cleaning up of the environment. For example, the organic wastes (vegetable peels, remains of animals, feces, etc.) are broken down into harmless and usable substances by bacteria. Recall that bacteria are also used in the preparation of medicines. In agriculture they are used to increase soil fertility by fixing nitrogen.You have learnt in Class VII that milk is turned into curd by bacteria.Curd contains several micro-organisms. 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. An important ingredient of rava (sooji)idlis and bhaturas is curd. Can you guess why? Bacteria and yeast are also helpful for fermentation of rice idli and dosa batter. Kneading of Yeast and sugar into the flour causes the flour to rise and double in size. Yeast reproduces rapidly and produces carbon dioxide during respiration. Bubbles of the gas fill the dough and increase its volume.This is the basis of the use of yeast in the baking industry for making breads,pastries and cakes.Commercial Use of Microorganisms:Microorganisms are used for the large-scale production of alcohol, wine and acetic acid(vinegar).

Yeast is used for commercial production of alcohol and wine. For this purpose, yeast is grown on natural sugars present in grains like barley, wheat, rice,crushed fruit juices, etc. Adding a spoon full of yeast powder into sugar solution gives out a characteristic smell after few hours.This is the smell of alcohol as sugar has been converted into alcohol by yeast.This process of conversion of sugar into alcohol is known as fermentation.Louis Pasteur discovered fermentation In 1857.

Que. 1) In the process of fermentation the sugar is converted into……
(a) Vinegar. (b) Curd
(c) Salt. (d) Alcohol

Que. 2) Name the bacterium which when added to milk, multiplies in it and converts milk into curd?
(a) Lactobacillus. (b) Streptococcus
(c) Salmonella. (d) Vibrio

Que. 3) Louis Pasteur a French chemist in 1857 discovered the process of……?
(a) Fermentation. (b) Pollination
(c) Saturation. (d) Composting

Que. 4) Explain the process of doubling of flour after addition of yeast into it.

Que. 5) Name some of the common uses of microorganisms.

Answer Key

Que. 1) (d) Alcohol

Que. 2) (a) Lactobacillus

Que. 3) (a) Fermentation

Que. 4) Answer: After adding yeast and sugar into the flour, the yeast reproduces rapidly and produces carbon dioxide during respiration. Bubbles of gas fill the dough and hence the volume of dough is doubled in size.

Que. 5) Answer: Microorganisms are useful in various purposes like in the preparation of curd, bread and cake. It is used in the production of alcohol as well as medicines. These are also used to increase the fertility of soil.

Case study 3

Whenever you fall ill the doctor may give you some antibiotic tablets, capsules or injections such as of penicillin. The source of these medicines is microorganisms. These medicines kill or stop the growth of the disease-causing microorganisms. Such medicines are called antibiotics. These days a number of antibiotics are being produced from bacteria and fungi. Streptomycin, tetracycline and erythromycin are some of thecommonly known antibiotics which are made from fungi and bacteria. The antibiotics are manufactured by growing specific microorganisms and are used to cure a variety of diseases. Antibiotics are even mixed with the feed of livestock and poultry to check microbial infection in animals. They are also used to control many plant diseases.In 1929, Alexander Fleming was working on a culture of disease- causing bacteria. Suddenly he found the spores of a little green mould in one of his culture plates. He observed that the presence of mould prevented the growth of bacteria. In fact, it also killed many of these bacteria. From this the mould penicillin was prepared.When a disease-carrying microbe enters our body, the body produces antibodies to fight the invader. The body also remembers how to

fight the microbe if it enters again. If dead or weakened microbes are introduced into a healthy body, the body fights and kills the invading bacteria by producing suitable antibodies. The antibodies remain in the body and we are protected from the disease-causing microbes for ever. This is how a vaccine works. Several diseases, including cholera, tuberculosis, smallpox and hepatitis can be prevented by vaccination.Edward Jenner discovered the vaccine for small- pox in 1798.In your childhood, you must have been given injections to protect yourself against several diseases. Can you prepare a list of these diseases? You may take help from your parents.

It is essential to protect all children against these diseases. Necessary vaccines are available in the nearby hospitals. You might have seen the advertisement on TV and newspapers regarding protection of children against polio under the Pulse Polio Programme. Polio drops given to children are actually a vaccine. A worldwide campaign against smallpox has finally led to its eradication from most parts of the world. These days vaccines are made on a large scale from microorganisms to protect humans and other animals from several diseases.

Que. 1) Which among the following scientist discovered the vaccine for Small pox in 1798?

(a) Edward Jenner. (b) Alexander Fleming
(c) Carl Linnaeus. (d) Rosalind Franklin

Que. 2) When a disease carrying microbe enters our body, the body produces …… to fight against it.

(a) Soldiers. (b) Antibodies
(c) Viruses. (d) Bacteria

Que. 3) In which year did Alexander Fleming a Scottish Physician discover penicillin?

(a) 1932. (b) 1987
(c) 1947. (d) 1929

Que. 4) Define antibiotics and give their uses.

Que. 5) Name some of the diseases that can be prevented by taking vaccination.

Answer Key

Que. 1) (a) Edward Jenner

Que. 2) (b) Antibodies

Que. 3) (d) 1929

Que. 4) Answer: Antibiotics are medicines produced from microorganisms that kill or stop the growth of disease-causing microorganisms. Some common examples include Streptomycin, Tetracycline and erythromycin. They are used to cure a variety of human and plant diseases and also to check microbial infection in animals.

Que. 5) Answer: Some diseases that can be prevented by taking vaccination are Cholera, tuberculosis, smallpox, and hepatitis.

Case study 4

Microorganisms are harmful in manyways. Some of the microorganismscause diseases in human beings, plantsand animals. Such disease-causing microorganisms are called pathogens.Some microorganisms spoil food,clothing and leather. Let us study moreabout their harmful activities.Pathogens enter our body through theair we breathe, the water we drink orthe food we eat. They can also gettransmitted by direct contact with aninfected person or carried by an animal.Microbial diseases that can spread froman infected person to a healthy personthrough air, water, food or physicalcontact are called communicablediseases. Examples of such diseasesinclude cholera, common cold, chickenpox and tuberculosis.When a person suffering fromcommon cold sneezes, fine droplets ofmoisture carrying thousands of virusesare spread in the air. The virus may enterthe body of a healthy person whilebreathing and cause infection.There are some insects and animalswhich act as carriers of disease-causing microbes. Housefly is one suchcarrier. The flies sit on the garbage andanimal excreta. Pathogens stick to theirbodies. When these flies sit on uncoveredfood, they may transfer the pathogens.Whoever eats the contaminated food islikely to get sick. So, it is advisable toalways keep food covered. Avoidconsuming uncovered items of food.Another example of a carrier is thefemale Anopheles mosquito,which carries the parasite of malaria(Plasmodium). Female Aedes mosquitoacts as carrier of dengue virus.How can we control the spread of malariaor dengue?All mosquitoes breed in water. Hence,one should not let water collectanywhere, in coolers, tyres, flower pot,etc. By keeping the surroundings cleanand dry we can prevent mosquitoes frombreeding. Try to make a list of measureswhich help to avoid the spread ofmalaria.Several microorganisms not only causediseases in humans and plants, but alsoin other animals. For example, anthraxis a dangerous human and cattledisease caused by a bacterium. Footand mouth disease of cattle is causedby a virus.RobertKöch(1876)discovered the bacterium(Bacillus anthracis) whichcauses anthrax disease.Severalmicroorganismscausediseases in plants like wheat, rice, potato,sugarcane, orange, apple and others.The diseases reduce the yield of crops. They can be controlled by theuse of certain chemicals which kill themicrobes.

Que. 1) Disease causing microorganisms are called as ……
(a) Antibodies. (b) Macrophages
(c) Pathogens. (d) Eosinophils

Que. 2) Which among the following insect acts as the carrier of dengue virus?

(a) Female Anopheles. (b) Female Aedes
(c) Female Culex. (d) Ochlerotatus

Que. 3) Robert Koch in 1876 discovered the bacterium (Bacillus anthracis) which causes…….... disease.
(a) Anthrax. (b) Malaria
(c) Chikungunya. (d) Cholera

Que. 4) Define the term “communicable diseases” with some examples.

Que. 5) How can we control the spread of diseases caused by mosquitoes?

Answer Key

Que. 1) (c) Pathogens

Que. 2) (b) Female Aedes

Que. 3) (a) Anthrax

Que. 4) Answer: Microbial diseases that can spread from an infected person to a healthy person through air, water, food or physical contact are called communicable diseases. Cholera, common cold, chicken pox, and tuberculosis are some of the examples.

Que. 5) Answer: Breeding of mosquitoes occur in water. Therefore, by not letting water to collect in our surroundings like in coolers, tyres, flower pot, etc and keeping the surrounding clean and dry, we can control the spread of such diseases.

Case study 5

How do we preserve cooked foodat home? You know that bread leftunused under moist conditions isattacked by fungus. Microorganismsspoil our food. Spoiled food emits badsmell and has a bad taste and changedcolour. Is spoiling of food a chemicalreaction?Paheli bought some mangoes but shecould not eat them for a few days. Latershe found that they were spoilt androtten. But she knows that the mango picklesthat her grandmother makes does notspoil for a long time. She is confused.Let us study the common methodsof preserving food in our homes. Wehave to save it from the attack ofmicroorganisms.Chemical Method:Salts and edible oils are the commonchemicals generally used to check thegrowth of microorganisms. Therefore, they are called preservatives. We addsalt or acid preservatives to pickles toprevent the attack of microbes. Sodiumbenzoate and sodium metabisulphite arecommon preservatives. These are alsoused in jams and squashes to checktheir spoilage.Preservation by Common Salt:Common salt has been used to preservemeat and fish for ages. Meat and fishare covered with dry salt to checkthe growth of bacteria. Salting is alsoused to preserve amla, raw mangoes,tamarind, etc.Preservation by Sugar:Jams, jellies and squashes are preservedby sugar. Sugar reduces the moisturecontent which inhibits the growth ofbacteria which spoil food.Preservation by Oil and Vinegar:Use of oil and vinegar prevents spoilageof pickles because bacteria cannot livein such an environment. Vegetables,fruits, fish and meat are often preservedby this method.Heat

and Cold Treatments: You must have observed your motherboiling milk before it is stored or used.Boiling kills many microorganisms.Similarly, we keep our food in the refrigerator. Low temperature inhibits the growth of microbes.Pasteurised milk can be consumed without boiling as it is free from harmful microbes.The milk is heated to about 700C for 15 to 30 seconds and then suddenly chilled and stored. By doing so, it prevents the growth of microbes. This process was discovered by Louis Pasteur. It is called pasteurisation. Storage and Packing: These days dry fruits and even vegetables are sold in sealed air tight packets to prevent the attack of microbes.

Que. 1) Which of the following is NOT an example of chemical method of preservation?
(a) Salt
(b) Heating
(c) Sodium Benzoate
(d) Sodium Metabisulphite

Que. 2) ……. of milk before storing is done to kill many microorganisms.

(a) Mixing. (b) Distilling
(c) Baking. (d) Boiling

Que. 3) Pasteurisation technique was discovered by which of the following scientist?
(a) Louis Pasteur. (b) Fanny Hesse
(c) Ronald Ross. (d) Harold Ginsberg

Que. 4) Explain the process of Pasteurization in detail.

Que. 5) Name some of the common methods of food preservation at your home.

Answer Key

Que. 1) (b) Heating

Que. 2) (d) Boiling

Que. 3) (a) Louis Pasteur

Que. 4)Answer: In the pasteurisation process the milk is heated to about 700°C for 15 to 30 seconds and then suddenly chilled and stored. This process prevents the growth of microbes.

Que. 5) Answer: Some common methods of preservation include: Adding common salt to pickles, meat and fish. Using sugar as well as oil and vinegar are also some of the preservation methods.