# Story Of Microorganisms – 1

## Improve your learning

**Q. 1. Which organisms are interlinked between living and non-living organisms? Why do you think so?**

**Answer :** Viruses are a group of organisms which act as interlink between living and nonliving organisms. We think so because viruses are a group of organisms which exhibit characteristics both of living organisms and of nonliving organisms. Viruses are a special kind of case which exhibits properties intermediate of both.

They exhibit living characteristics in the following manner:

● Viruses have genetic material as the entire living organism possess and it can be RNA or DNA, and this nucleic acid i.e. genetic material remains protected by a covering called protein capsid.

● They are able to replicate and can synthesize nucleic acids and proteins but for all this, they require a host, another living organism whose biosynthetic machinery they will utilize for their propagation and survival.

They exhibit nonliving characteristics in the following manner:

● Unless they don't get any living host they are not able to replicate and propagate, therefore in absence of a living host, they will act as nonliving organism since they don't exhibit the property of replication.

Since they can exhibit the behavior of living organisms after entering into a living host and as a non-living organism in absence of a living host, viruses are considered as an interconnecting link between the living and nonliving organisms.

**Q. 2. What are micro-organisms? Do you find them?**

**Answer :** The name MICRO-ORGANISM itself provides a definition of itself.

Micro- It refers something which is very small in size and can't be seen with naked eyes or unaided eyes.

Organism- a living entity

Therefore, Microorganisms are the organisms very small in size which we can't see with naked eyes and require aids like a magnifying glass, microscope etc in order to see them.

Yes, we find microorganisms as they are found everywhere in nature.

A microorganism is a life form which exhibits extreme diversity. They are found everywhere from our body to everything that we see around us.

For example- The curd we eat contains tons of bacteria into it called *lactobacillus*.

The soil contains a variety of microorganisms into it.

The fecal material also contains bacteria into it.

**Q. 3. What type of microorganisms can we observe in pond water?**

**Answer :** We can observe bacteria, protozoa, and algae in pond water. Bacteria, protozoa, and algae are different classes of microorganisms.

Bacteria are found everywhere and are also present in a great amount in pond water.

Protozoa like an amoeba, paramecium are also found in pond water.

Algae like Chlorophyta also remain present in abundance.

**Q. 4. Whether micro-organisms are useful and harmful. How to explain.**

**Answer :** Microorganisms are both a friend and a foe for us. It is said because they are very much beneficial to us in some terms and are also harmful in some cases.

So, due to this dual nature of microorganisms are said to be both a friend and a foe for us.

Microorganisms are useful to us because they help in processes like-

● Fermentation- This process uses a diversity of microorganisms which is used for the production of different products in food and alcohol industry.

● Curd formation- For making curd we always add a small amount of curd as inoculums into the milk which converts complete milk into the curd. Lactobacillus bacteria play a role in it.

● Medicinal use- Microorganisms helps in the production of vaccines and antibiotics and thus helps mankind.

● Micro biota in our body- Our body also contains a variety of microorganisms inside it which helps our body in some way or the other.

For example- Gut microbiota helps in digestion of some dietary fibers.

● Decomposition- Bacteria and fungi act as decomposers and help in the conversion of organic waste into inorganic matter and thus help in the cleaning of the environment.

● The increment in soil fertility- Different microorganisms play important role in increasing the soil fertility. There are certain bacteria like Rhizobium, nostoc, which helps in nitrogen fixation and thus improves the fertility of the soil.

● Pesticides- There are some bacteria like *Bacillus thuringinesis* which help in the killing of pests by producing toxins and thus protects different crops.

● Genetically modified organisms- Bacteria like E.coli are used for genetic modifications due to their simpler organization and thus contribute to genetic engineering which is an important technology for mankind.

Now we will look at some points how microorganisms are harmful to us. Following are points which will depict the harmful nature of microorganisms:

● Disease in Human beings, animals, and plants- There are certain microorganisms which cause disease and they are termed as pathogens. There are many microorganisms which cause a deadly disease in humans, plants, and animals etc.

● Food poisoning- It is another harmful aspect of microorganisms in which microorganisms cause spoilage of food. They grow on food produce certain toxins which cause spoiling of food.

● Water pollution- Microorganisms also cause water pollution.

Microscopic algae grow in different water sources and cover the entire water source and this process is known as algal bloom. Algal bloom also causes the death of aquatic life as it creates hypoxic condition i.e. lack of oxygen due to which other aquatic life forms get die.

So, due to above-mentioned reasons microorganisms are both useful and harmful to us.

**Q. 5. How are the human actions causing the death of useful bacteria and fungi? What will happen if it continuous?**

**Answer :** With our day to day activities we are causing harm to useful bacteria and fungi in different ways which are as follows:

● Nowadays there is a great increase in the use of pesticides and fertilizers and farmers are using them in a blind manner without thinking of the fact that how much adverse effect they are causing. Fertilizers kill the microorganisms present in soil which play important role in improving soil fertility.

● Great use of pesticides along with killing pests is killing microorganisms.

● With the increasing industrialization, we dump the industrial wastes in different water sources or in land pits. But this processes of dumping wastes by disturbing the complete soil structure and leaching of harmful chemicals in water sources causes killing of microbial diversity which along with benefitting humans are also beneficial to different life forms present in soil and water sources.

If this process will continue mankind have to pay the great cost for it.

● The killing of various bacteria of soil lead to a decrement in soil fertility and thus we were not able to grow various crops.

● Our plants will also suffer from lack of nutrients as various microorganisms form a symbiotic association with the plants and provide essential nutrients to them.

● Since we are killing the bacteria and fungi which act as decomposers, the absence of them will lead to a huge amount of organic waste accumulating everywhere.

● Being a part of the ecosystem they also contribute to various nutrient cycles of the earth like nitrogen cycle by causing nitrogen fixation, carbon cycle. The killing of them will also disturb the ecosystem.

So, looking at the beneficial part of microorganism and harmful impact that we will have due to their extinction, we should always avoid those actions which cause killing of microbial diversity.

**Q. 6. Why the cooked food spoils soon but not uncooked food. Give your reasons.**

**Answer :** There are certain conditions which are very much favorable for the growth of the microorganisms. Cooked food provides all those favorable conditions to the microorganisms for their growth which is not provided by raw food.

In cooked food there is moisture due to water, the temperature is also appropriate which is suitable for growth of microorganisms and also an appropriate pH. This all conditions which are basic requirements for the growth of microorganisms are fulfilled by the cooked food more easily as compared to uncooked food.

So, microorganisms grow and cause spoilage of cooked food whereas raw food lacking all these conditions does not get spoil.

**Q. 7. What questions would you like to ask your teacher to know about different shapes of Bacteria?**

**Answer :** I would like to ask following questions about different shapes of Bacteria to my teacher:

● Do bacteria exist in different shapes?

● What advantages does the shape of bacteria confer to them?

● Why don’t all bacteria have one fixed shape?

● Does altering the shape of bacteria can help us to kill the bacteria or causing any harm to it?

● Does shape of bacteria is in some way related to its motility?

● Does in a different stage of their lives bacteria exhibit different shapes or they exhibit the same shape during their complete life cycle?

● Does their shape also contribute in their microscopic nature?

**Q. 8. What will happen if you add buttermilk to chilled milk?**

**Answer :** Normally when we add buttermilk to the milk at normal temperature or to the lukewarm milk we observe that after some duration milk gets changed into curd but the same thing doesn’t happen when buttermilk is added to the chilled milk. There will be no transformation of the milk into curd in case of chilled milk.

It happens because the conversion of milk into curd requires lactobacillus bacteria but chilled milk doesn’t provide the appropriate temperature that is required by the lactobacillus bacteria in order to grow.

Since there is no appropriate temperature for lactobacillus bacteria to grow, there is no growth of lactobacillus and chilled milk won’t convert into curd but there will be slight changes in its taste due to the presence of small amount of lactobacillus bacteria.

Therefore, when we add buttermilk to chilled milk there will be no change in it except a slight change in taste.

**Q. 9. How do you observe Lactobacillus bacterium?**

**Answer :** Since, lactobacillus is a microorganism we can’t see it with unaided eyes. In order to see lactobacillus bacteria we need to observe it under the microscope and for observing under the microscope we need to prepare the slide of buttermilk.

We will follow following steps for the slide preparation:

● Take a clean glass slide.

● Take drop equivalent buttermilk on the slide and spread it using an inoculation loop in order to get a thin smear for better visualization. If we won't spread it we won't be able to get a better picture.

● Now, we need to heat fix the bacteria in order to cause their fixation. We will slightly heat the slide for 2-3 seconds and don't let it get burn.

● Allow it to cool and add 2 drops of crystal violet in order to stain them. Wait for 1 minute. Don't add excess amount of crystal violet as it will cause over staining.

● Wash the slide with distilled water in order to remove extra stain.

● Clean the other portion of slide using tissue paper and let it air dry.

● After that observe the slide under compound microscope.

Using above steps we can observe the lactobacillus bacteria.

Fig: Lactobacillus bacteria under the microscope

**Q. 10. Visit any bakery or milk chilling center near your school with the help of your teacher or parents. Learn about some techniques to culture and usage of some Microorganisms and prepare a note on them.**

**Answer :** After visiting bakery and milk chilling center I found that they use the following techniques:

● Pasteurization: In this technique, milk is boiled at very high temperatures and then kept in extremely low temperatures.

These temperatures prevent the growth of microorganisms and thus help in storage of milk in chilling centers.

● Fermentation: This process is used in a bakery where yeast and microorganisms are used to rises the dough of various bakery products. As they produce carbon dioxide and other gases it provides distinct taste to bakery products.

● Baking: In this process, dry heat is provided to the doughs raised by yeast and microorganisms in order to make their outer surface hard and inner surface soft.

**Microorganisms used in the bakery are as follows:**

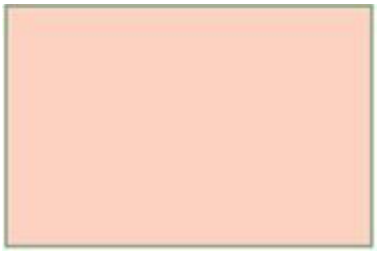
● *Saccharomyces cerevisae:* This is known as baker's yeast and helps in the fermentation process in the bakery.

● Acetobacter: It is used in the production of vinegar and chocolates.

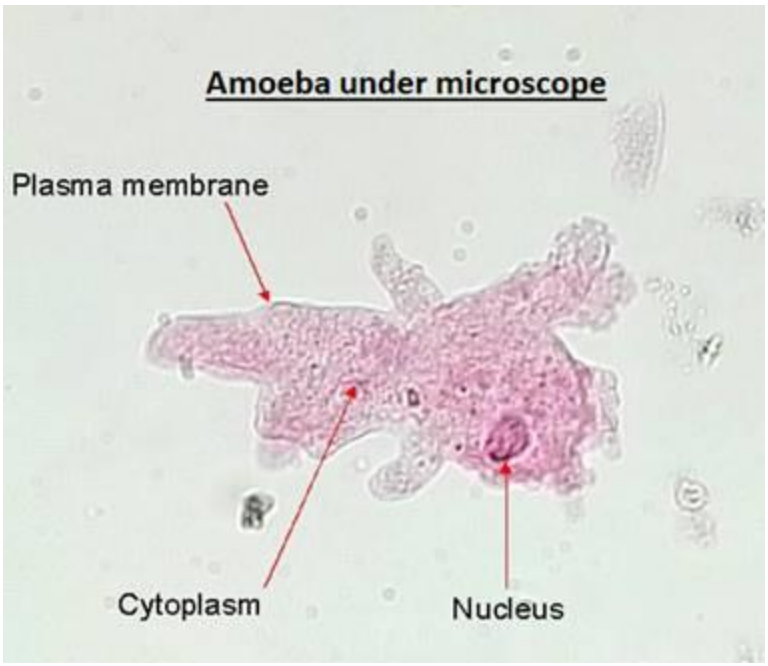
● Aspergillus: It is used in the formation of soy sauce.

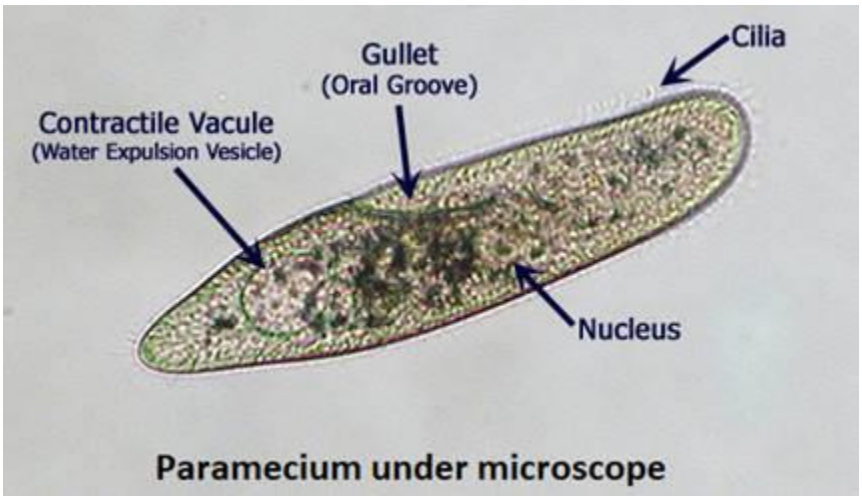
● Bifidobacterium: It is used in the formation of yogurt.

**Q. 11. Observe some permanent slides of microorganisms in your school lab with the help of a microscope. Draw its picture.**



**Answer :**




**Q. 12. Prepare a model of any microorganism. And write a note on them.**

**Answer :** A model of amoeba as shown below can be prepared.


Amoeba is a single cell microscopic organism which is found in water bodies.

It always keeps on changing its shape with the help of the pseudopodia. (Pseudo-false and podia-feet) i.e. amoeba have this false feet which help it to continuously change its shape and capture its food.

Being unicellular all functions of amoeba are performed by a single cell.

It consists of the following parts:

● Cell membrane: Cell of amoeba is lined by a thin layer which allows passing of materials through it selectively.

● Pseudopodia: As told above pseudopodia are false feet present in amoeba. These are kind of outgrowths which help it to move, change its shape and capture its food. With the help of pseudopodia it takes its food.

● Cytoplasm: This is the liquid substance present within the cell. It is also responsible for the formation of pseudopodia. The cytoplasm contains nucleus and vacuoles inside it.

● Nucleus: It controls all activities of amoeba. It is also surrounded by a membrane.

● Contractile vacuole: It regulates the quantity of water present in cell.

● Food vacuole: It stores the food taken by amoeba.

Amoeba is also able to cause diseases. It causes disease like amoebiasis.

**Q. 13. Why should we clean our hands with soap before eating?**

**Answer :** We should clean our hands with soap before eating due to following reasons:

● If we will not clean our hands with soap we will get affected by certain diseases. Certain microbes will enter our body through food and will cause diseases.

● Cleaning of hands with soap will act as a disinfection process and kill microbes present on our hands and thus protect us from diseases.

# Story Of microorganisms – 2

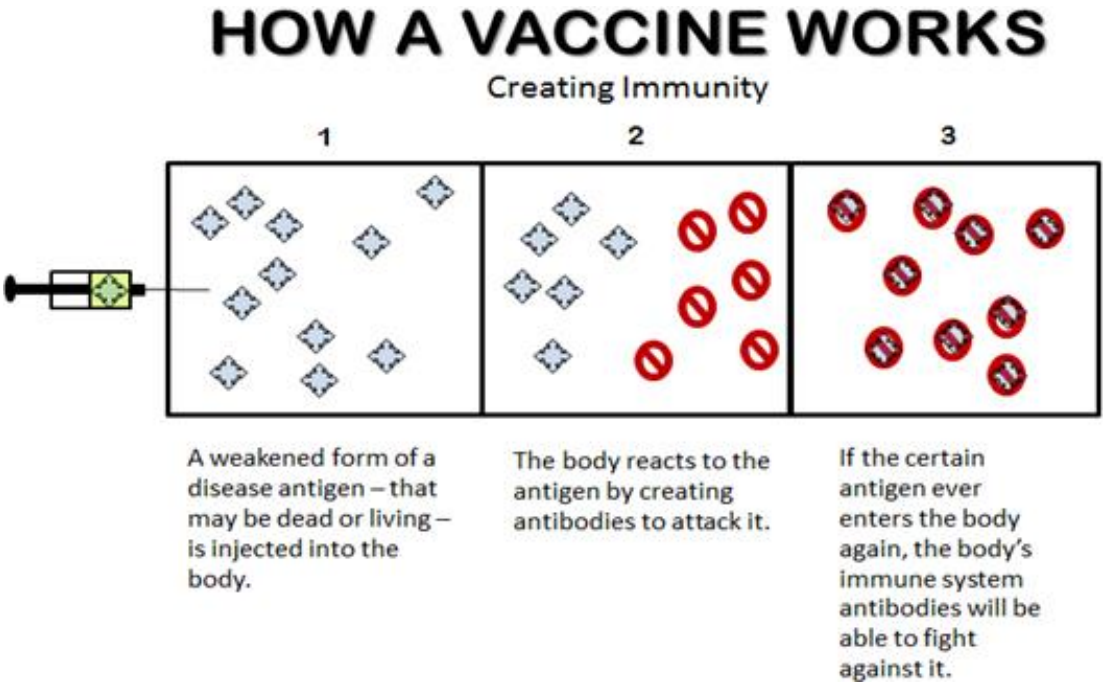
## Improve your learning

**Q. 1. How do vaccines works in our body?**

**Answer :** Vaccines contain weakened microorganisms which are able to cause disease but not upto very extreme level which can cause great harm to the body.

Since vaccines cause the disease they enable our bodies to release antibodies which fight with the disease causing microorganisms. Antibodies have a memory of diseases which occur once. So, due to vaccines antibodies get formed in our body for the respective disease and if in future we get infected by those disease antibodies present in our body due to vaccines attack the disease and we get a cure in short period of time.

In this way, vaccines protect us from very harmful effects of various diseases.




**Q. 2. What are the differences between Antibiotic and Vaccine?**

**Answer :**

| Antibiotics | Vaccines |
|---|---|
| • These are the medicines which kill microorganisms. | These are weakened microorganisms which can cause disease but not upto very extreme level due to weakening. |
| • These are prescribed by the doctor after any infection or disease. | These are given as a prior preparation in order to make antibodies in the body for certain diseases. |
| • This provides protection for a short period of time. | This provides protection for a long period of time because they produce antibodies which have memory within them. |
| • The first antibiotic was discovered by Dr. Alexander Fleming. | Concept of vaccination was introduced by Dr. Edward Jenner. |
| • Example- Streptomycin, Erythromycin are some examples of antibiotics. | Example- Polio drops, measles vaccine are some examples of vaccine. |

**Q. 3. The invention of pencil line protected the world from deaths during the first world war, explain.**

**Answer :** During the First World War many soldiers died due to bacterial infection.

Dr. Alexander Fleming was an army doctor at that time and was working on antibiotics in his laboratory. One day he found that there was some growth of fungi (mould) which was preventing the growth of the bacteria. He tested that fungi and found that it also killed other bacteria and that fungi were *Penicillium notatum.*

After this discovery fungi *Penicillium notatum* was used as antibiotic (substances that kill bacteria) namely penicillin to cure the infections of the soldiers with infected wounds due to bacteria.

Since, use of penicillin as antibiotic helped in curing the bacterial infections many deaths were prevented during First World War.

**Q. 4. Take three bowls and mark as A, B, C. Pour lukewarm milk in bowl A, hot milk in bowl B, cold milk in bowl C. Add one tea spoon of curd or butter milk in three bowls and stir them slightly. Cover the bowls with lids. Keep the bowls undisturbed for five to six hours. In which bowl milk turned into curd? Give your reasons.**

**Answer :** The milk will be turned into curd in bowl A and not in other bowls.

Explanation: Lactobacillus is the bacteria required for the formation of curd and it requires an appropriate temperature for its growth. Lukewarm milk not being very much cool and hot provides that appropriate temperature and hence lukewarm milk get converted into milk.

But bowl B and C contains hot and cold milk which do not provide appropriate temperature for the growth of bacteria due to which bacteria doesn't grow in them and they are not converted into curd.

**Q. 5. Collect more information about scientists who invented and discovered other facts related to Microorganisms. How these discoveries helped mankind? Make a chart presentation and paste it on your classroom wall Magazine.**

**Answer :** Microbiology is the field of science which deals with the microorganisms and related aspects. This field involves the contribution of many scientists who started working in this field many years back.

In order to collect information about microbiologists or scientists contributed in these fields authentic and famous books of microbiology like Prescott, Pelczar needs to be referred. Other source can be internet where it can be studied that how study about

microorganisms had evolved with new discoveries and facts and how this discoveries had affected human life.

Later on notes can be prepared about those scientists which can be presented over chart including highlighted information of remarkable discoveries in this field like role of Alexander Fleming who discovered antibiotics etc.

**Q. 6. Make an Album of scientists and their discoveries related to Microorganisms.**

**Answer :** In this an album can be prepared by taking photographs of scientists with major discoveries along with little description of their discovery.

The album can be prepared year wise which will help you to know that how studies about microorganisms had evolved. Secondly along with scientists' picture some pictures related to their work can also be fixed in album.

Other way of preparing album is to devote a single page of album to each scientist where you can have description of particular scientist and their discovery.

In this way an album can be prepared.

**Q. 7. Visit the veterinary hospital and prepare a list of cattle diseases by asking questions to the doctor?**

**Answer :** After a visit to veterinary hospital I found that the cattle suffer from following diseases:

● Anthrax

● Foot and mouth diseases

● Viral diseases in prawns

● Ringworm

Anthrax

Foot disease

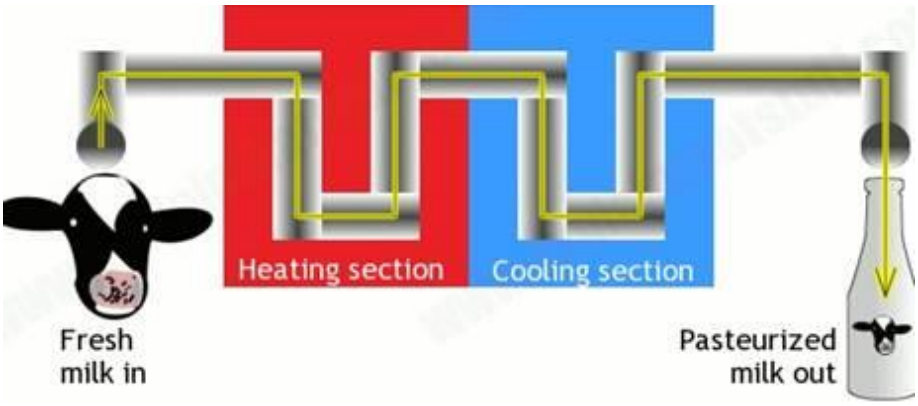
Mouth disease

Ringworm

**Q. 8. What is pasteurisation? What is the use of it?**

**Answer :** Pasteurisation is a method of preservation of milk. In this firstly milk is boiled at a temperature 70°C for 15 to 30 seconds and then suddenly chilled and stored at low temperatures. Due to this growth of microorganisms are prevented.

Use of Pasteurisation- Due to pasteurization growth of microorganisms is prevented and thus they help in storage of milk for a longer period. Pasteurisation prevents spoilage of milk.



**Q. 9. How do you appreciate Edward Jenner's experiments?**

**Answer :** Contribution of Edward Jenner is remarkable. Experiments of Edward Jenner led to the discovery of vaccines.

He was the first one to give the concept of vaccination and as we know due to vaccination only we are protected from many diseases.

Also at the time of discovery of vaccination by Edward Jenner, this was a great discovery because at that time many people were suffering from small pox and his discovery saved the lives of many people.

So, Edward Jenner's experiments are highly appreciable because due to his experiments only vaccination was introduced which is only cure for many diseases.

**Q. 10. Visit a nearby milk chilling center. Observe the process and make a report on it. (40**

**Answer :** Pasteurisation is the process which was observed in the milk chilling center. In this process firstly milk was heated at temperatures up to 70°C for 15 to 30 seconds and are then chilled and stored at low temperatures.

It was told by the owner of milk chilling center this is the process that they use for long storage of milk and this process prevents the growth of microorganisms and thus prevent spoilage of milk.

**Q. 11. "Prevention is better than cure" comment.**

**Answer :** It is very truly said that "Prevention is better than cure" due to following reasons:

● When a person suffers from a disease it affects functioning of many organs of the person and even it is not sure that person will recover in case of deadly disease. Therefore, it is always better to prevent diseases.

● Secondly, since treatment takes time it affects the person at both mental and financial level. A great time get wasted during that period.

● Also, in the case of communicable disease, the person becomes the source which communicates disease to other person and thus affects the lives of others.

Due to the above-mentioned reasons, it is always better to prevent the disease than a cure.

**Q. 12. Raheem tells to his neighbours, "stagnation of sewage in our surroundings is harmful to our health." Do you support this? Why?**

**Answer :** Yes, I support Raheem because stagnation of sewage in our surroundings led to growth of many disease-causing microorganisms. Stagnation of sewage provides a favorable environment to the disease-causing microorganisms and they start growing there in large number and act as a great threat to our life.

Also, many other organisms like housefly who keep roaming in our homes sit on that sewage and then on our foods and other things and thus cause different diseases.

So, Raheem is very correct that stagnation of sewage is harmful to our health.

**Q. 13. Jeevan said that "If there are no microorganisms earth will remain with wastes" will you agree this statement, why?**

**Answer :** Yes, I agree to the statement of Jeevan that “if there are no microorganisms earth will remain with wastes.”

There are many microorganisms which are saprophytes and live on the dead organic matter. They cause degradation and decomposition of those waste materials and convert those complex organic substances into simpler inorganic substances and thus clean the earth.

If there will be no microorganisms there will be no decomposition, degradation, and conversion of complex organic substances into simpler inorganic substances and wastes keep on accumulating everywhere and in this way our earth will become dirty.

So, Presence of microorganisms is quite essential for cleaning of the earth surface.

**Q. 14. Pranavi is suffering from serious illness. Doctor prescribed antibiotics for five days. After three days of usage she stopped taking antibiotics. Is it right or not, discuss.**

**Answer :** It is not right on part of Pranavi to stop taking antibiotics by herself as she is suffering from serious illness and doctor has prescribed her antibiotics for five days.

We should always complete the dose prescribed by the doctor because when we do not complete the dose chance of acquiring the disease again becomes more and also complete dosage kills the disease-causing microorganisms in our body while incomplete dosage only weakens them.

Therefore, in the case of incomplete dosage chance of acquiring the same disease becomes more. So, in order to avoid the disease again, complete dosage should be taken by us prescribed by the doctor.

So, it is not right on the part of Pranavi to stop taking antibiotics in between because due to this chances of her becoming ill again increase.

**Q. 15. What are the precautions taken to eradicate malaria?**

**Answer :** Following precautions need to be taken to avoid malaria:

● Stagnation of water needs to be avoided because stagnant water provides favorable environment to the mosquitoes to grow.

● Mosquito nets should be used to prevent entry of mosquitoes.

● Mosquito repelling sprays should be sprayed from time to time.

● Mosquito avoiding creams should be applied to the body before going to sleep and should wear full sleeves cloth.

● Doors and windows need to be closed in the evening time in order to avoid entry of mosquitoes.

**Q. 16. One medical store owner is giving antibiotics to his customer who is suffering from fever without a doctor's prescription? But the customer's daughter Malathi is telling her father not to take antibiotics without doctor's prescription. Whom do you support and why?**

**Answer :** I will support Malathi as she is true that her father should not take antibiotics without doctor's prescription.

Taking antibiotics without doctor's prescription can be harmful for us because it can even kill essential microorganisms present in our body. Also, antibiotics affect our blood cells which fight with the disease causing organisms. Taking of unnecessary antibiotics increase resistance in our body and due to which disease causing organisms are not killed in our body when we take them because our body becomes resistant to those antibiotics.

So, we should always take antibiotics on doctor's prescription as they prescribe antibiotics only when they are needed and in proper dosage due to which no harm is caused to our body.