

Revision Notes for Class 8 Science

Chapter 2 – Microorganisms: Friend and Foe

Microorganisms:

- There are numerous organisms living around us that we may not be able to see. We can see some of them through a magnifying glass, like the fungus on bread. Some others are so small that they cannot be seen without a microscope.
- These organisms that cannot be seen by unaided eyes are termed microorganisms or microbes.
- The Microorganisms can be Broadly Classified as:

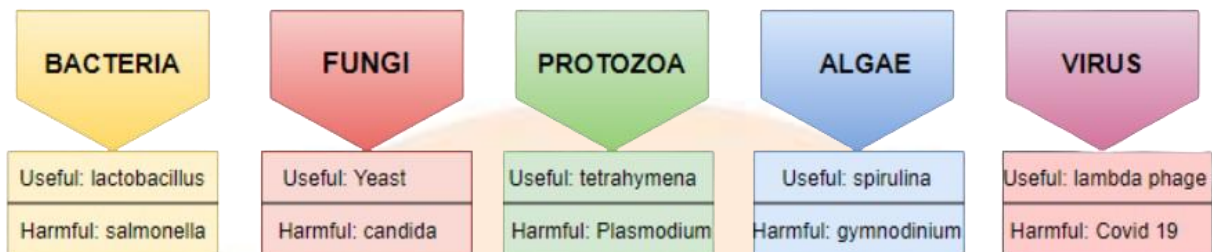
a. Bacteria - They are a group of prokaryotic organisms (does not have membrane-bound nucleus or organelles) that constitute a major part of microorganisms. They can inhabit soil, water, and every other habit found on earth. They can be a few micrometres in length and can be of various shapes like spheres, rods, or spirals. Example - Escherichia coli, coliform bacteria, etc.

b. Fungi - They are a group of eukaryotic organisms (have a membrane-bound nucleus and organelles) that are usually heterotrophic in nature. Examples - Penicillium, bread mould, mushroom, etc.

c. Protozoa - They are a group of unicellular eukaryotic organisms that may be parasitic or living independently and are heterotrophic (cannot prepare their own food) in nature. Example - Amoeba, paramecium, etc.

d. Algae - They are a group of photosynthetic eukaryotic organisms that are predominantly aquatic. Example - Spirogyra, Chlamydomonas, etc.

- These groups of microorganisms may be harmful or useful in nature.



- The virus is also a microorganism, but they differ from the others in this group as they can reproduce only in the body of a host, be it animals, plants, or humans. Example - AIDS, herpes, rubella, zika, etc.

Where do Microorganisms Live?

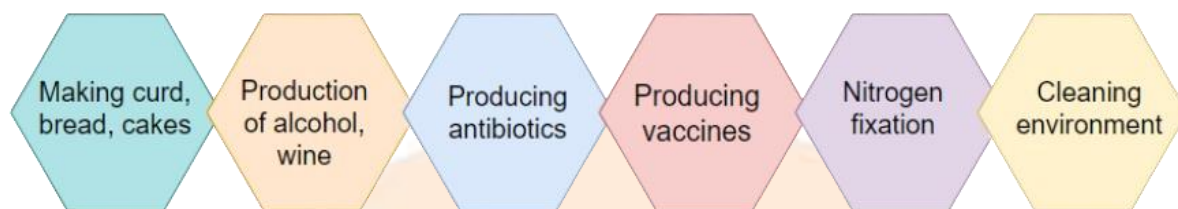
- The microorganism may be single-celled or unicellular as in bacteria, protozoa or they may be multicellular as in fungi, animals, etc.
- They can survive in water, air and all kinds of environmental conditions like extreme cold climate to even the hot springs, deserts, and marshy lands. Some of them even live inside the body of animals, and even humans.
- Some of them grow on their own whereas others thrive on the body of other animals.

Microorganisms and us:

It is to be noted that these microorganisms play a vital role in our lives. Some of them may be beneficial to us whereas some of them may have an adverse and harmful effect on us.

Friendly Use of Microorganisms:

Microorganisms can be put to multiple uses, be it in the making of alcohol, bread, cake, or medicines or in agriculture or cleaning the environment.



a. Making of Curd and Bread:

- A bacterium, namely lactobacillus, multiplies in milk converting it into curd. The making of cheese, pickles, and various other food products also involve the use of bacteria.
- The process of fermentation
- conversion of sugar to alcohol
- conversion of sugar alcohol that is required in the rice batter for making idlis and dosa is again helped by bacteria and yeast.
- When yeast is added to a dough, it reproduces rapidly releasing carbon dioxide which bubbles into the dough, making it rise. This property of yeast is used to make bread, cakes, etc.

b. Commercial Use of Microorganisms:

- Yeast is an ingredient that is widely used in the production of alcohol, wine, and vinegar. This is done by growing yeast on the natural sugar present in the fruit juices like grapes, grains like barley, wheat, rice, etc.
- The sugars are converted to alcohol by fermentation.

c. Medicinal Use of Microorganisms:

- The source of the widely used medicines, antibiotics (medicines that stop or kill the disease-causing agents) are again microorganisms.
- These are manufactured by growing specific as a cure for various diseases.
- Some of the antibiotics are streptomycin, erythromycin, azithromycin, etc.

d. Vaccine:

- A disease-causing microorganism called a pathogen produces antibodies against it when it enters our body. These antibodies are retained in our body and we are protected from that disease forever.
- A Vaccine is a biological substance that initiates the production of antibodies for a specific disease. Thus a vaccination protects us from that specific disease.
- Children are generally vaccinated for many diseases like polio, tuberculosis, chickenpox, hepatitis, etc. Smallpox has been eradicated this way. And currently, the Covid vaccine is doing the same.

e. Increasing Soil Fertility:

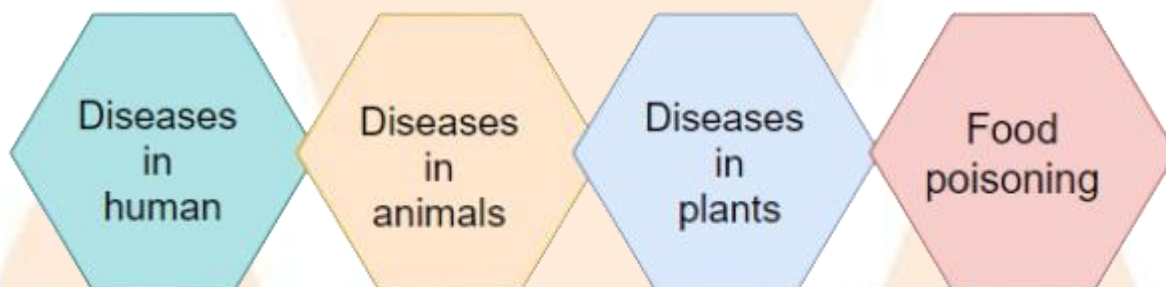
- There are some bacteria, like rhizobium that are present in the soil, generally in the roots of leguminous plants, that are capable of fixing the atmospheric nitrogen to enrich the soil with nitrogen which increases the fertility of the soil and the yield of the crop.

f. Cleaning the Environment:

- Some of the microorganisms have the ability to decompose dead organic matter and convert them into simpler substances or manure that can be reused for animals or plants, making the environment clean.

Harmful Uses of Microorganisms:

They can be harmful in numerous ways to humans, plants, and animals and cause diseases. As stated, the disease-causing microorganisms are known by the name of pathogens.



a. Disease-Causing Microorganisms in Humans:

- The harmful pathogens enter the body of humans by means of air, water, or food. They can then spread to others by contact with the infected person or through an animal or insect.
- The diseases that can spread from an infected person to a healthy person by means of air, water, or contact are termed communicable diseases. Examples - plague, chickenpox, tuberculosis, common cold, and the current Covid 19 infections.
- These disease-bearing microorganisms are sometimes carried by insects and animals then they are termed as carriers of that disease. For example - the female anopheles mosquito is the carrier of Plasmodium that causes malaria.
- The mode of transmission, type of microorganism, the disease caused by these microorganisms, and their prevention differ from each other as shown below:

Human diseases	Causative microorganism	Mode of transmission
Polio	Virus	Air/water
Chicken Pox	Virus	Air
Measles	Virus	Air
Hepatitis	Virus	Water
Zika	Virus	Aedes mosquito
Typhoid	Bacteria	Water
Cholera	Bacteria	Water/food
Malaria	Protozoa	Female anopheles Mosquito
Kala-Azar	Protozoa	Sandflies

- The prevention of these diseases follows a general pattern of keeping the affected person and his belongings isolated, personal hygiene, proper sanitary practices, drinking boiled and clean water, controlling breeding sites of mosquitoes, consuming properly cooked food, and above vaccination against all these diseases on schedule.

b. Disease-Causing Microorganisms in Animals:

Many of the microorganisms are a cause of certain diseases in animals too. A few of the diseases found in animals is as shown below:

Animal diseases	Causative microorganism	Mode of transmission
Foot and mouth disease	Virus	Close contact with animals.
Anthrax	Bacteria	Contact with infected meat

c. Disease-Causing Microorganisms in Plants:

Many microorganisms are responsible for diseases in plants of potato, rice, wheat, sugarcane, etc reducing the quality and quantity of the yield of the crops. These diseases can be controlled

by the use of chemicals that destroys these organisms. Some of the diseases of plants are listed as below:

Plant diseases	Causative microorganism	Mode of transmission
Yellow vein mosaic in bhindi (Okra)	Virus	Insect
Citrus canker	Bacteria	Air
Rust of wheat	Fungi	Air/seeds

d. Food Poisoning:

When the microorganisms contaminate the food, they sometimes produce toxic substances which leads to the ill health of a person consuming it and has health problems like vomiting and needs to be taken to a hospital. This condition of consuming food contaminated with microorganisms is called food poisoning.

Preservation of food:

As discussed above, contamination of the food by microorganisms leads to a change in the color and taste of the food. Several methods can be followed to prevent this microorganism attack. Some of them are as follows:

a. Chemical method: Generally salts and edible oils are used to control their growth and these are termed preservatives. Example - salt in pickles, sodium benzoate in jams.

b. Common salt: This is a common practice where meat and fish or some fruits like raw mangoes, tamarind, etc are covered with salt to last them for longer periods.

c. Sugar: Some food items like jams and jellies are preserved in sugar which reduces the moisture to inhibit the growth of microorganisms.

d. Oil and vinegar: This is also used commonly as the microorganisms cannot live in such conditions. This is widely used in making pickles.

e. Heat and cold treatments: It is a common practice to boil milk in order to store it. The method of heating milk to eliminate the microbes present in it is called pasteurization. Similarly storing food at low temperatures also prevents the growth of these microbes.

Storage and Packing

Storage: Proper storage of food is crucial to keep it safe from harmful microorganisms. Food should be stored in clean, airtight containers and kept at the right temperature to prevent spoilage. For example, refrigeration slows down the growth of bacteria and moulds.

Packing: Good packing methods protect food from contamination. Using sealed packages prevents microorganisms from getting into the food. It also helps in preserving the food's freshness and extends its shelf life.

By following these practices, we can minimise the risk of foodborne illnesses and ensure that food stays safe and fresh.

Nitrogen Fixation:

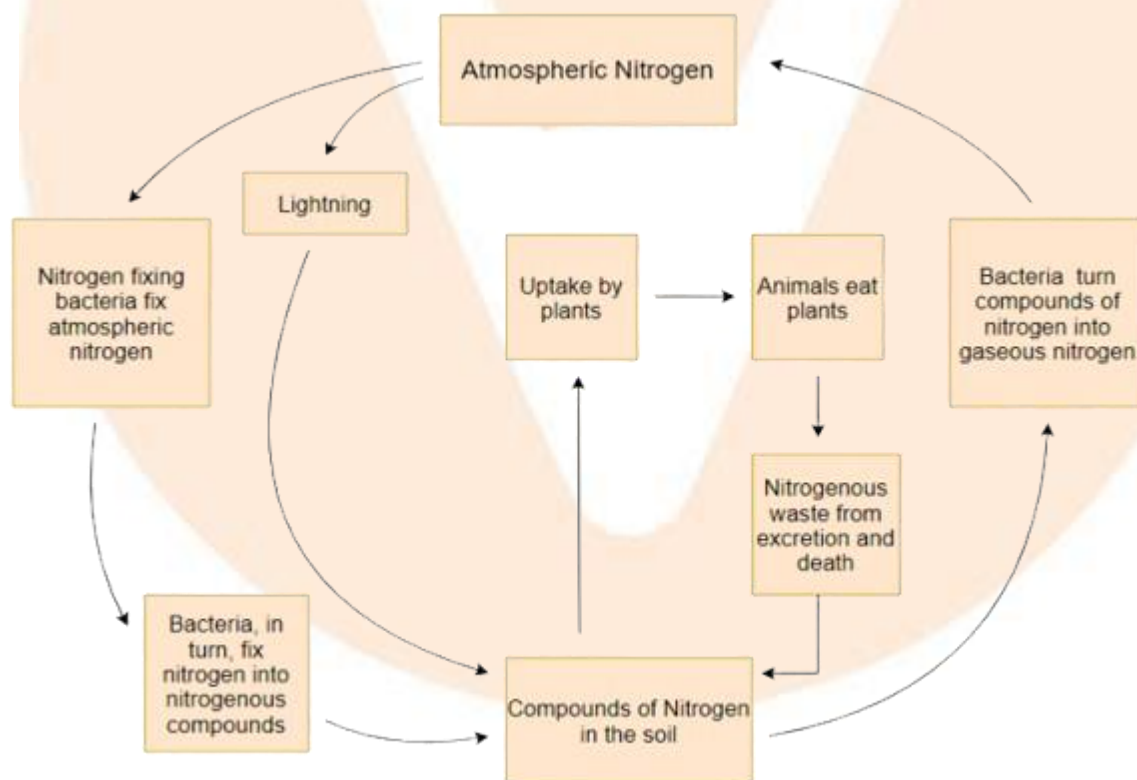
Nitrogen fixation is a process where certain microorganisms help convert nitrogen from the air into a form that plants can use. In Class 8 Science Chapter 2, you'll learn that plants need nitrogen to grow, but they can't use the nitrogen gas (N_2) in the air directly.

Certain bacteria, like those found in the roots of leguminous plants (e.g., peas, beans), have the ability to convert this nitrogen into nitrates and ammonia. These forms of nitrogen are then absorbed by plants through their roots and used to make important proteins and other compounds. This process is crucial for healthy plant growth and helps in maintaining soil fertility.

Nitrogen Cycle:

- The nitrogen cycle can be defined as a biochemical process of circulating the nitrogen in the atmosphere, through soil, organisms, and back to the atmosphere.

- The nitrogen present in the atmosphere cannot be consumed by plants or animals directly.
- This nitrogen needs to be converted to nitrogenous compounds by some bacteria in the soil.
- This converted form of nitrogen is used by the plants and when the animals feed on them they get that.
- The fungi and bacteria in the soil convert the nitrogen present in dead plants and animals to either gaseous or compounds that are reused by the plants.
- Thus the balance of nitrogen is maintained in the atmosphere.



Nitrogen Cycle