CHAPTER – 8

BACTERIA AND FUNGI – THEIR ECONOMIC IMPORTANCE

P. 106 Check Your Progress 1

A. Name the following.

1. *Staphylococcus*
2. *Escherichia coli*
3. *Spirillum*
4. Plasmid
5. Saprophytic
6. Endospores
7. *Streptomyces*
8. Typhoid, tuberculosis
9. Leaf spot disease in cotton caused by *Xanthomonas malvacearum* and bacterial wilt of potato caused by *Ralstonia solanacearum*.
10. *Bacillus anthracis*
11. *Lactobacillus*

P. 108 Check Your Progress 2

A. Name the following.

1. *Mucor*, *Rhizopus*
2. White button mushroom (*Agaricus bisporus*)
3. Fly agaric (*Amanita muscaria*)
4. *Saccharomyces cerevisiae*
5. Stem rust disease

P. 109 Exercises

I. Multiple-Choice Questions

A. Choose the most appropriate answer.

1. c	**2.** b	**3.** c	**4.** a
5. c	**6.** c	**7.** b	**8.** c
9. c	**10.** c		

II. Assertion–Reason Type Questions

A. **1.** c **2.** a **3.** d **4.** c

III. Very Short Answer Type Questions

A. Complete the following paragraph by filling in the blanks (1) to (5) with appropriate words.

1. eukaryotic
2. chitin
3. absorption
4. spore formation
5. yeast

B. Match the items in Column A with those in Column B and write down the matching pairs.

1. d **2.** c **3.** a **4.** b

C. Arrange and rewrite the terms in each group in the correct order beginning with the underlined term in the group.

1. Chromosome replication, Cell elongation, Chromosome separation, Septum formation, Cell division
2. Mycelium growth, Fruiting body formation, Spore production, Spore dispersal, Spore germination
3. Pasteurization of milk, Cooling of milk, Addition of bacterial culture, Fermentation by bacteria, Packaging of yogurt

IV. Short Answer Type Questions

A. Answer these questions.

1. Bacteria move with their flagella. No, all the bacteria do not move, because they do not have flagella.
2. The conditions for bacterial growth are
   i. Optimum temperature between 25°C–40°C.
   ii. Moist environment
3. Environment gets benefitted by bacteria in several ways:
   i. Bacteria decompose dead animals and plants.
   ii. Several bacteria fix N_2 and improve soil fertility.
   iii. They help in generating biogas.
4. Yes, it is true that some bacteria live in digestive tract of herbivores. Since mammals do not have any enzyme to digest cellulose, therefore such symbiotic bacteria decompose cellulose into simpler forms and thus help in digestion of cellulose.
5. Harmful fungi – Mould–its spores cause allergy.
6. Certain bacteria help in curing tea by eating away unwanted compounds, producing the characteristic flavour. Raw leather is brittle and contains many fatty compounds. The raw skin is immersed in water containing bacteria which eat away the fatty compounds and make the skin soft. Specific humidity and temperature are maintained for this purpose.

B. Bacteria are very useful to mankind. State the useful role of bacteria in the following areas.

1. **Agriculture:** Nitrification – The process of

conversion of ammonia into nitrites and nitrates by bacteria in the soil takes place in two steps:

i. The *Nitrosomonas* bacteria oxidize ammonia (NH_3) to nitrites (NO_2).

ii. The *Nitrobacter* bacteria oxidize nitrites into nitrates (NO_3). This nitrate is taken up by the plants.

2. **Nitrogen Fixation:** The conversion of free atmospheric nitrogen into nitrogen compounds is done by free-living nitrogen-fixing bacteria like *Azotobacter*, *Clostridium*, or symbiotic bacteria which live in the root nodules of leguminous plants (eg. *Rhizobium*) can fix free nitrogen into nitrates.

3. **Production of Vitamins:** Many bacteria live in the intestine of humans and synthesize certain vitamins such as Vitamin B-complex. Some bacteria live in the intestine of herbivore animals and help in the digestion of cellulose.

4. **Production of Medicines:** Bacteria are used in the production of certain antibiotics such as streptomycin, aureomycin, terramycin, etc. Certain genetically induced bacteria produce insulin which is used in research laboratories and in drug production.

5. **Production of Antibiotics:** Antibiotics are used as medicines to fight diseases, as food preservatives to preserve fish and meat, in treating animal feed to prevent internal infections.

   i. Streptomycin is one of the most widely used antibiotic obtained from a bacterium *Streptomyces griseus*. Streptomycin cures tuberculosis.

   ii. Chlortetracycline is produced from *Streptomyces aureofaciens* and cures typhoid.

   iii. Chloramphenicol is produced from *Streptomyces venezuelae*.

6. **Production of Serum and Vaccines:** Serum contains antitoxin. The introduction of serum into the blood is an attempt to build up resistance in the body against microorganisms or their toxins. Human genes are introduced into bacteria such as *Escherichia coli* which is genetically modified. Desirable products can then be extracted from such bacteria. Some examples of bacterial serum are insulin, blood coagulating factor VIII for treatment of haemophilia A, factor IX for the treatment of haemophilia B.

   Vaccines are live weakened germs used to produce active immunity to a disease. The common vaccines obtained from bacteria are TAB vaccine for typhoid made from killed bacteria, BCG Vaccine for tuberculosis made by using live weakened bacteria.

C. Differentiate between the following.

1. **Decay** is the complete breakdown of organic matter by bacteria without giving out a foul smell.

   Putrefaction is the incomplete breakdown of organic matter by giving out a foul smell.

2. **Antibiotics:** Chemical substances obtained from the bacterial cells which are used to treat diseases caused by bacteria itself are called antibiotics. Antibiotics obtained from bacteria e.g. streptomycin, aureomycin, penicillin from *Penicillium* (fungi). Both bacteria and fungi are used for antibiotics production.

   Antitoxin: Serum in blood contains antitoxin which is produced by the body to fight or build up resistance against microorganisms or their toxins before they can actually enter the body and cause harm.

3. Cultivation of mushroom involves:

   Composting: The wheat or paddy straw is mixed with chicken manure and organic and inorganic fertilizers to prepare a compost. The compost is kept at about 50°C for about one week.

   Spawning: Mushroom seed containing mycelium is spread on the compost and left for 2-3 days.

V. Long Answer Type Questions

A. Answer these questions.

1. Industrial use of bacteria

   In industry, bacteria are used in curdling of milk, retting of fibres, jute and hemp, tanning of leather, production of vinegar, cheese making, processing of coffee, tobacco etc. Curd is prepared by the conversion of milk sugar (lactose) in the milk to lactic acid, and in the process curd is made.

   Industrial use of fungi:

   i. In the wine industry, sugar is fermented by yeast to produce ethyl alcohol and carbon dioxide. Carbon dioxide is given off as a

byproduct which is solidified in the form of dry ice. Wine is prepared from grapes and beer is prepared from barley. The yeast (*Saccharomyces cerevisiae*) is used in the fermentation process.

ii. In the process of cheese production, *Penicillium* and *Aspergillus* are used for flavouring process. Cheese is manufactured by:

- Curdling of milk by adding Lactic acid bacteria (*Lactobacillus*) into milk, curd processing, salting and then ripening of curd by keeping it at optimum temperature and moisture. *Penicillium* and *Aspergillus* are then added for flavouring the cheese.
- In the bread-making industry, yeast is added to bring sponginess to the bread.

Fungi are used to produce chemical compounds that are important to the food processing industry such as citric acid and gluconic acid. Citric acid is used in soft drinks and candies.

2. Antibiotics: Chemical substances obtained from the bacterial cells which are used to treat diseases caused by bacteria itself are called antibiotics. Antibiotics obtained from bacteria e.g. streptomycin, aureomycin.

Both bacteria and fungi are used for antibiotics production.

VI. Structured/Application/Skill Type Questions

A. The table given below describes certain microorganisms and the product obtained from them. Complete the following table by filling in the blanks numbered 1 to 6.

1. Fungi

2. *Streptomyces griseus*

3. Fungi

4. Citric acid

5. Bacteria

6. Chloramphenicol