

BIOLOGY • CLASS 12

8

CHAPTER

Microbes in Human Welfare

CHAPTER NOTES



MICROBES EVERYWHERE

WHERE DO MICROBES LIVE?

- Microbes occur in soil, water and air.
- They also live on and inside plants, animals and humans.
- Some survive in extreme places such as hot springs, deep oceans, snow and deserts.



Soil



Pond
(Water)



Air



Hot spring



Deep
ocean



Snow



Human

MAJOR GROUPS

1.



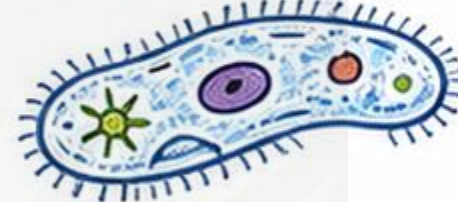
Bacteria

2.



Fungi

3.



Protozoa

4.



Microscopic algae

5.



Viruses
acellular infectious
agents

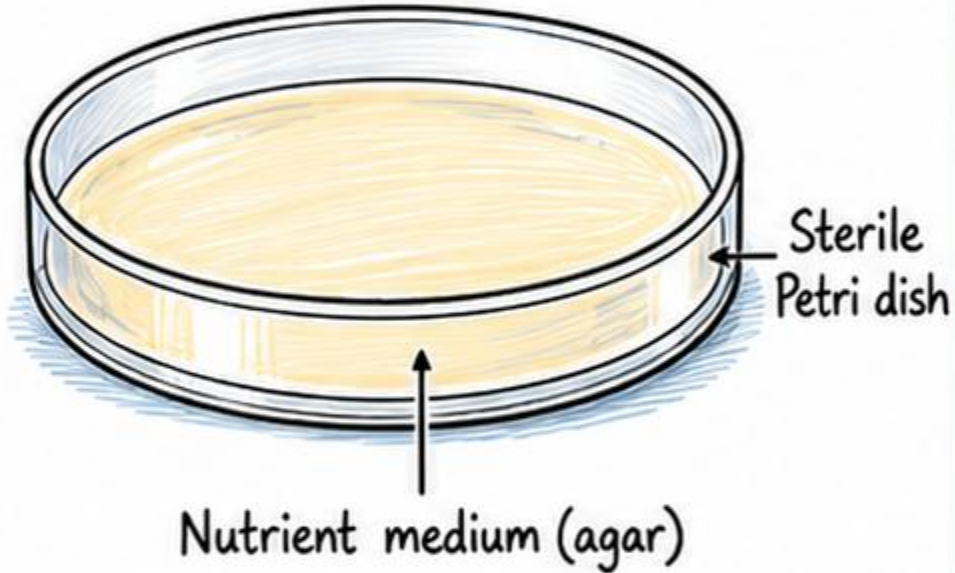
MICROBE = an organism or biological agent
too small to be seen clearly without magnification.

★ Only a small fraction of microbes cause disease. Many are useful. ★

MICROBIAL CULTURES & COLONIES

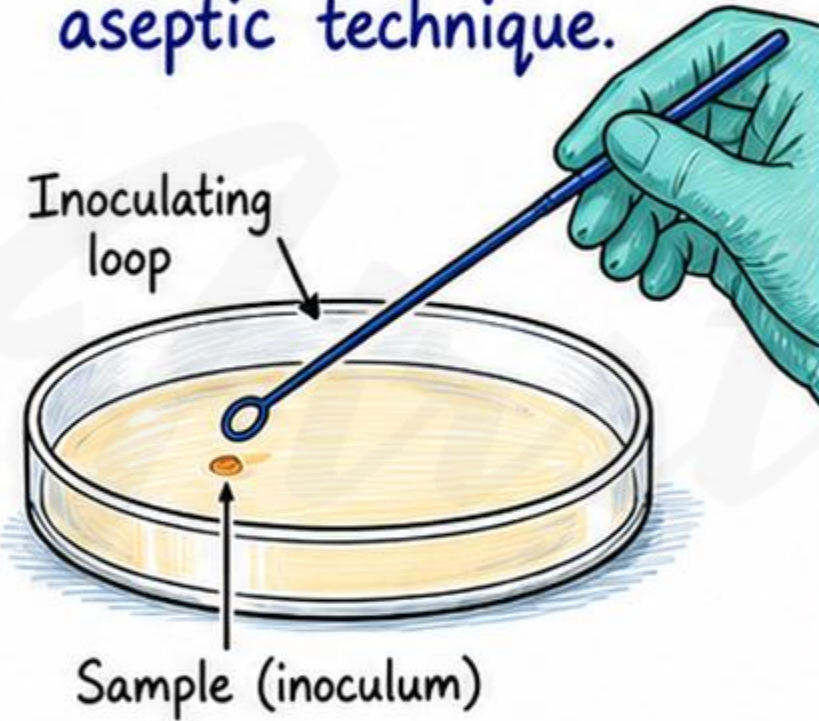
① NUTRIENT MEDIUM

A nutrient medium supplies water and nutrients needed for microbial growth.



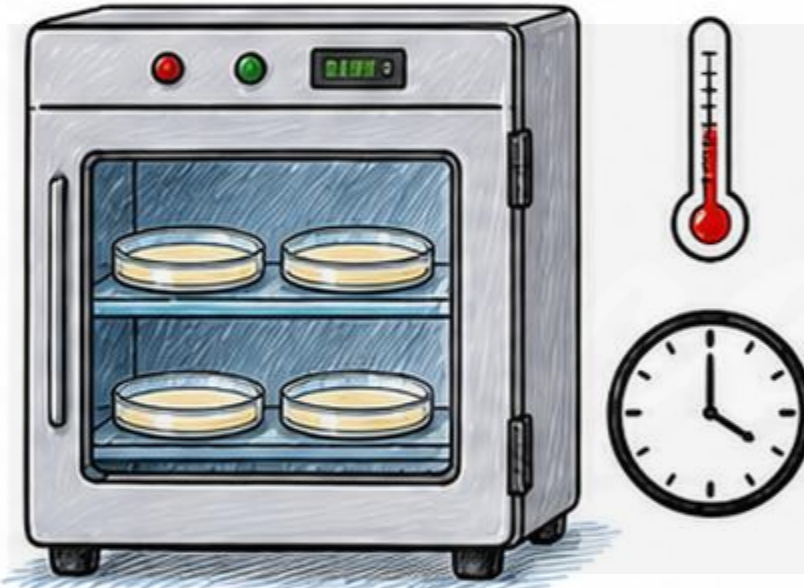
② INOCULATION

A small sample is placed on the sterile medium using aseptic technique.



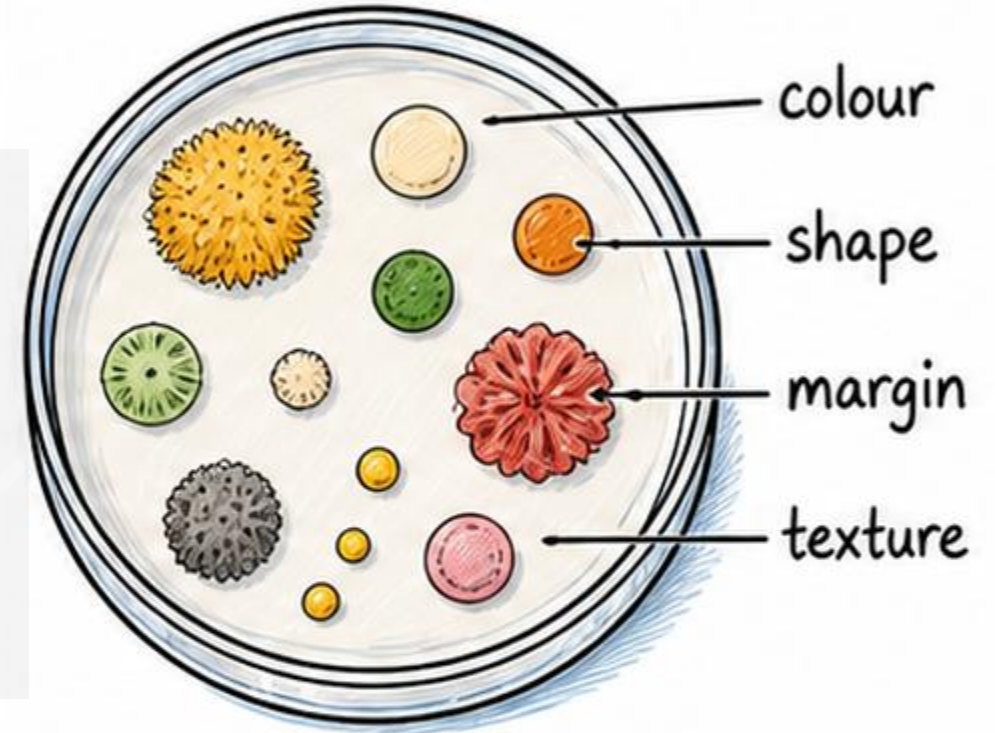
③ INCUBATION

Suitable temperature and time allow microbial cells to multiply.



④ COLONIES

Repeated cell division forms visible colonies.



PURE CULTURE = a culture containing only one kind of microorganism.

COLONY = a visible mass of microbial cells grown on a nutrient medium.

★ Colonies may be seen with the naked eye, but individual microbial cells usually need magnification.



Aseptic technique prevents unwanted contamination.



Colony appearance helps preliminary identification; it does not alone prove identity.



Microscopy and biochemical or molecular tests confirm identity.

LACTIC ACID BACTERIA & CURD

LAB = lactic acid bacteria,
mainly *Lactobacillus*
in this example.

Lactic acid lowers pH. The acidic
condition causes milk proteins to
coagulate and gives curd its sour taste.

① WARM MILK



~ 40-45°C
(warm, not boiling)

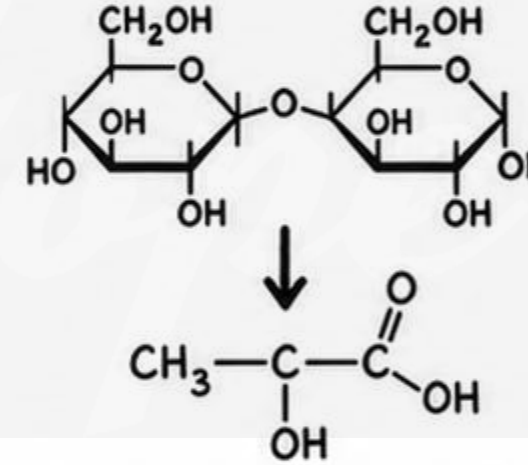
② ADD A LITTLE CURD
starter / inoculum



③ *Lactobacillus*
multiplies



④ Lactose →
lactic acid



⑤ Milk proteins
coagulate → CURD SETS



PARTIAL DIGESTION

LAB partially digest
milk proteins.



VITAMIN B₁₂

Curd has more vitamin B₁₂
than milk in the NCERT
account.



GUT BENEFIT

LAB can help check some
disease-causing microbes
in the stomach and intestine.

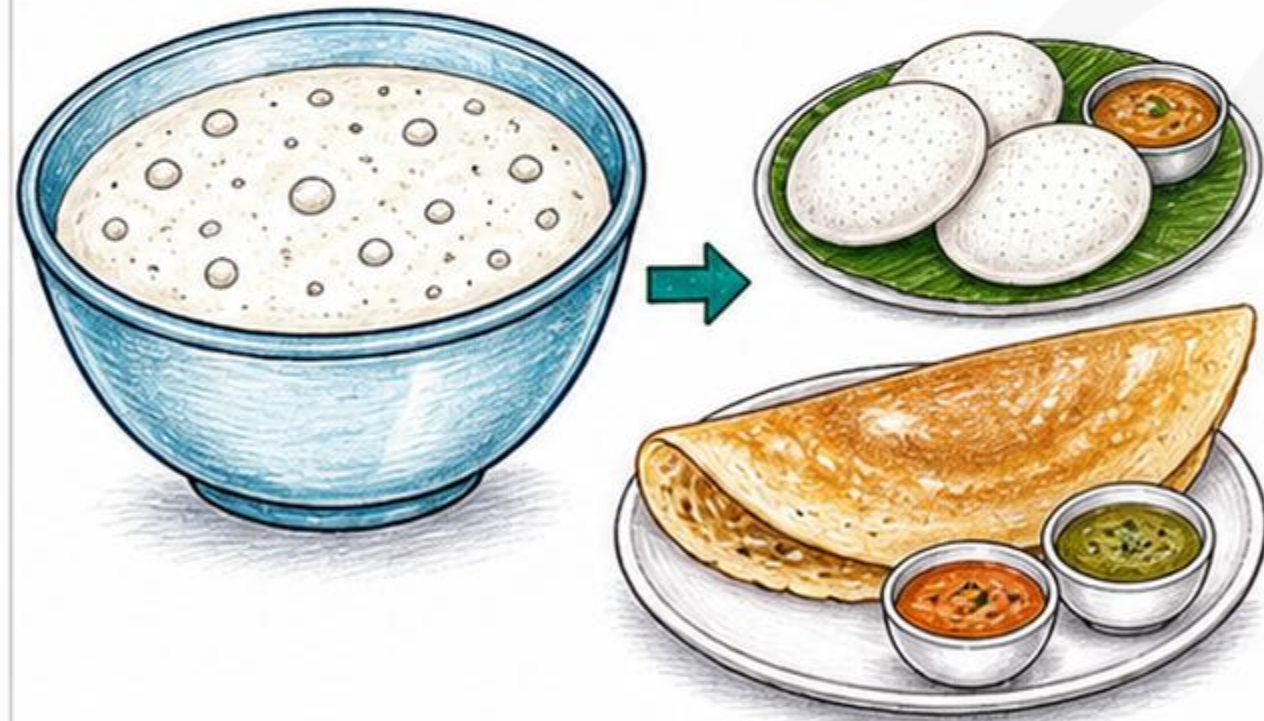


Use a clean starter and keep the milk warm—not boiling—while curd sets.

MICROBES IN FERMENTED FOODS

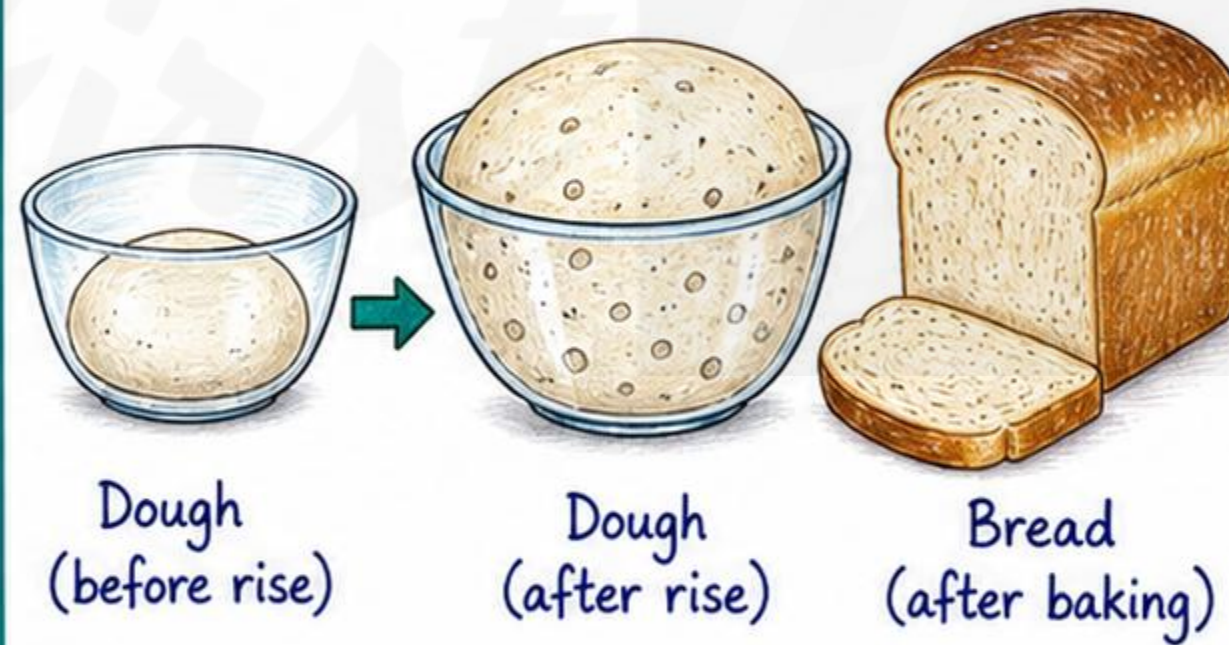
IDLI & DOSA BATTER

- Bacteria ferment the wet rice-dal batter.
- Fermentation $\rightarrow$ CO_2
- Gas bubbles make the batter soft, porous and slightly sour.



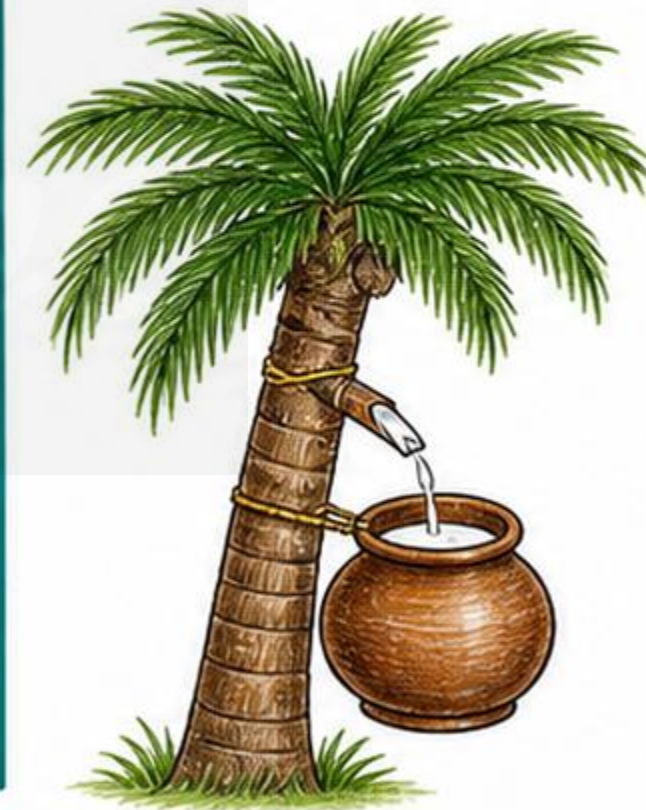
BREAD

- Baker's yeast = *Saccharomyces cerevisiae*
- Yeast ferments sugars in dough.
- Sugar $\rightarrow$ ethanol + CO_2
- Trapped CO_2 expands and makes the dough rise.



TODDY & OTHER FOODS

- Toddy is made by natural fermentation of palm sap.
- Microbes are also used to ferment fish, soybean and bamboo shoots.



FISH



SOYBEAN



BAMBOO SHOOTS

FERMENTATION = microbial conversion of food substances into new products, often with acids, gases or alcohol.

★ Different foods use different microbial communities and conditions.

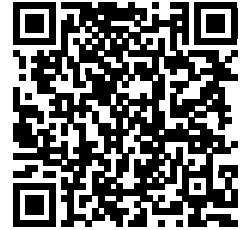


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