

UNIT-I

MORPHOLOGY OF BACTERIA



CENTURION
UNIVERSITY
Shaping Lives...
Empowering Communities!

RASMITA JENA
ASSISTANT PROFESSOR
SoPLS, CUTM, BBSR

MICROBIAL GROUPS

- Based on the morphological, phylogenetic and physiological characteristics, microorganisms are divided into six distinct groups, they are as follows

- 1) Bacteria
- 2) Archaea
- 3) Fungi
- 4) Protozoa
- 5) Algae
- 6) Viruses

1) BACTERIA:

- These are prokaryotes that are usually single celled organisms. They multiply by binary fission and reproduces asexually.
- They are the most **dominant group of** microorganisms in soil, water and air.
- Some bacteria even live in environment that has extreme temperatures, pH or salinity. Many of them play more **beneficial roles in** nutrient cycling, decomposition of organic matter, production of commercial industrial products like vitamins, antibiotics, etc. Wherein, some of them cause diseases and food spoilage. Ex: *Bacillus*, *Pseudomonas*.



bacillus (rod)



coccus (spherical)



spirillum (spiral)



spirichete (corkscrew)



vibrio (comma)



diplococcus



cluster of cocci



pair of cocci



chain of bacilli



(a) Coccus



(d) Vibrio



Bacteria Types

Coccus

Bacillus

Coccobacillus

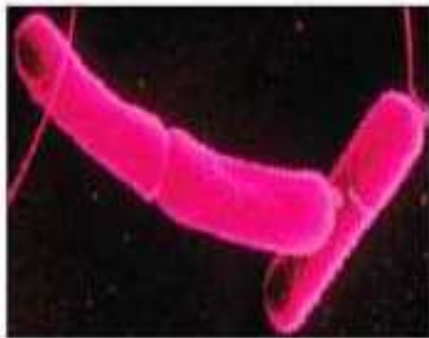
Vibrio

Spirillum

Spirochete



(b) Rod (bacillus)



(e) Spirillum



(c) Coccobacillus



(f) Spirichete



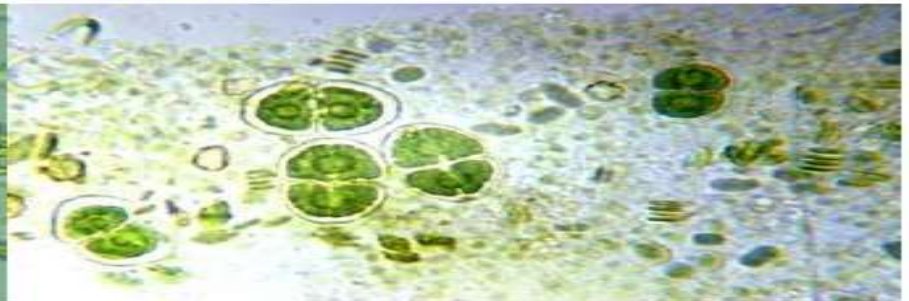
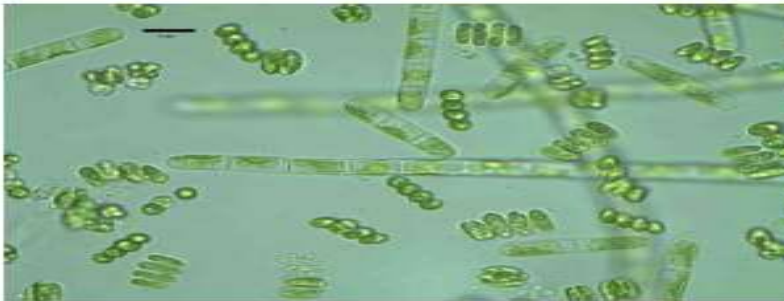
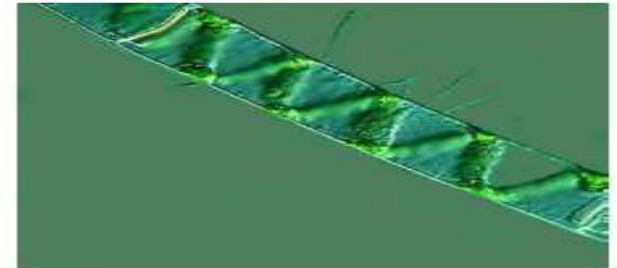
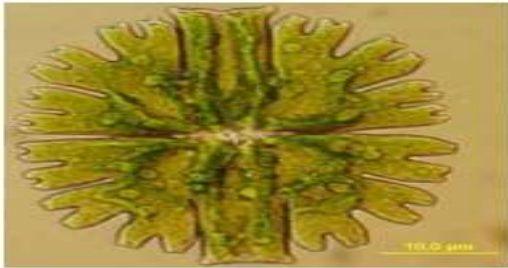
2) ARCHAEA:

- These are phylogenetically related prokaryotes that are distinguished from bacteria by many features, most notably their unique ribosomal RNA sequences.
- Many archaea are found in **extreme environments**.
- Some have **unusual metabolic** characteristics, such as the **methanogens, which generate methane gas**.

Ex: *Methano bacterium*.

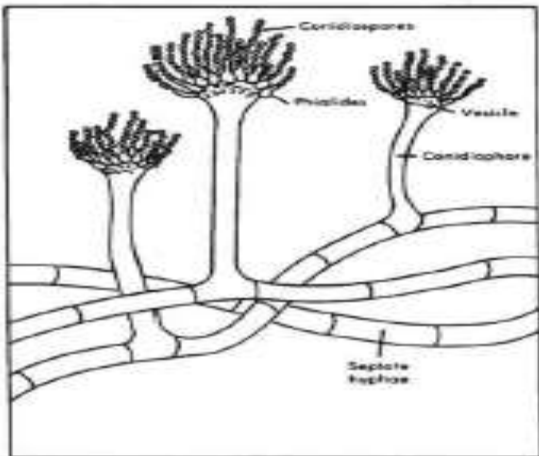
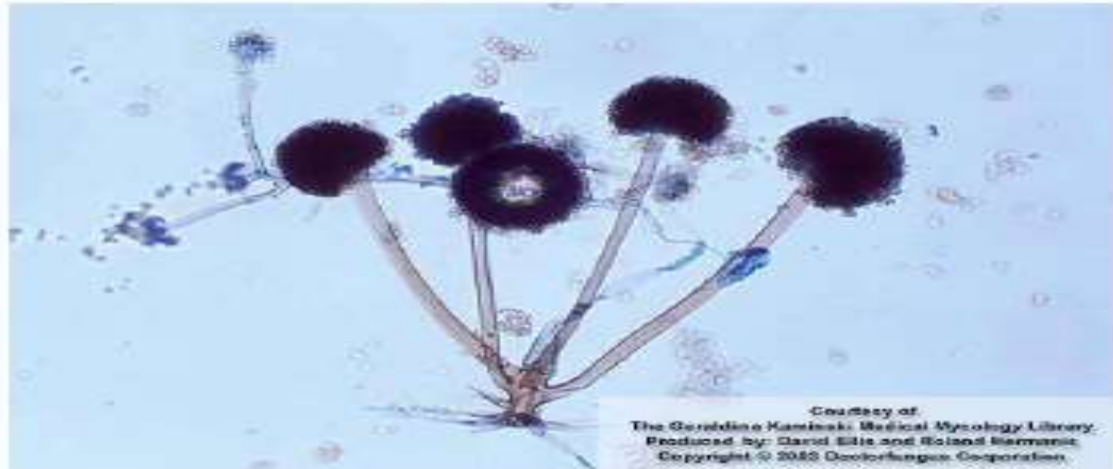
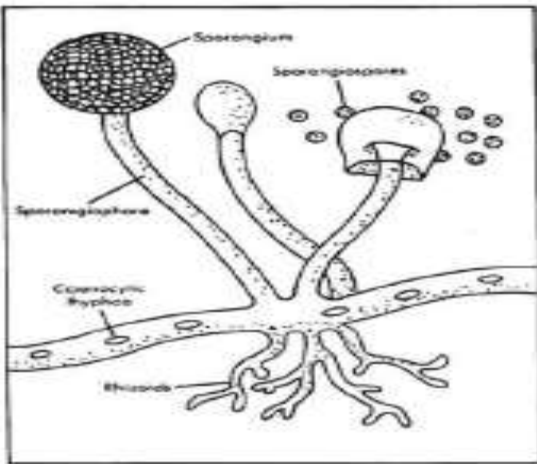
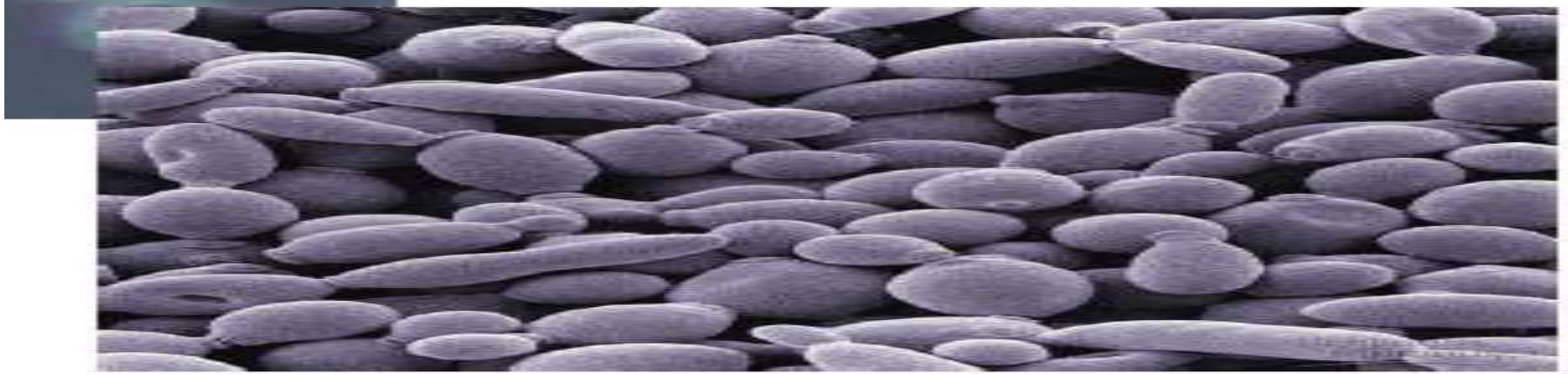
3) ALGAE:

- **These are eukaryotes that contain chlorophyll and are capable of performing photosynthesis.** Algae are found most commonly in **aquatic environments**.
- **They** reproduce either sexually or asexually. Mostly they are used as food supplements. They are mainly used in the preparation of agar. Ex: *Spirulina*, *Gelidium*.



4) FUNGI:

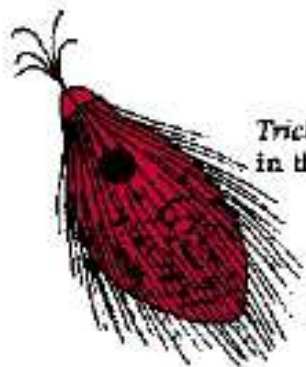
- These are **eukaryotes**. **Next to bacteria, they are the most dominant organism in the soil.**
- In general, fungi range in size and shape from single-celled microscopic yeasts to giant multicellular mushrooms.
- They possess filamentous **mycelium composed of individual hyphae and reproduce either sexually or asexually by fission, budding or by** means of spores borne on fruiting structures.
- **Unicellular fungi like yeast are involved in** the production of alcoholic beverages like wine and beer.
- **Multicellular fungi like molds** are useful for industrial production of antibiotics like penicillin. Ex: *Mucor*, *Rhizopus*.



5) PROTOZOA:

- These are **unicellular eukaryotes that are usually motile and lack cell wall.**
- Many free living protozoa function as the **primary hunters and grazers of the microbial** world. They can be found in many different environments and some are normal inhabitants of the intestinal tracts of animals, where they aid in digestion of complex materials such as cellulose.
- Some of them are parasitic and can cause diseases. Ex: *Amoeba, Paramecium.*

A few well-known Protozoa



Trichonympha lives in the gut of termites

0 50 μ m



Trypanosoma gambiense
(causes African sleeping sickness)



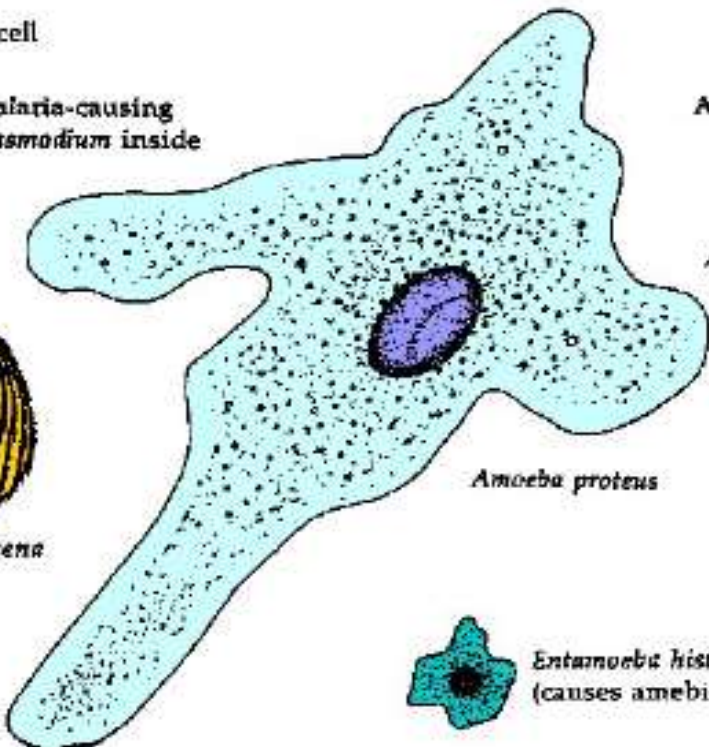
Euglena viridis



A red blood cell



Malaria-causing *Plasmodium* inside



Amoeba proteus

A dinoflagellate



Tetrahymena

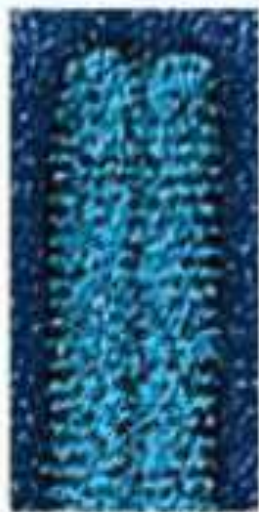
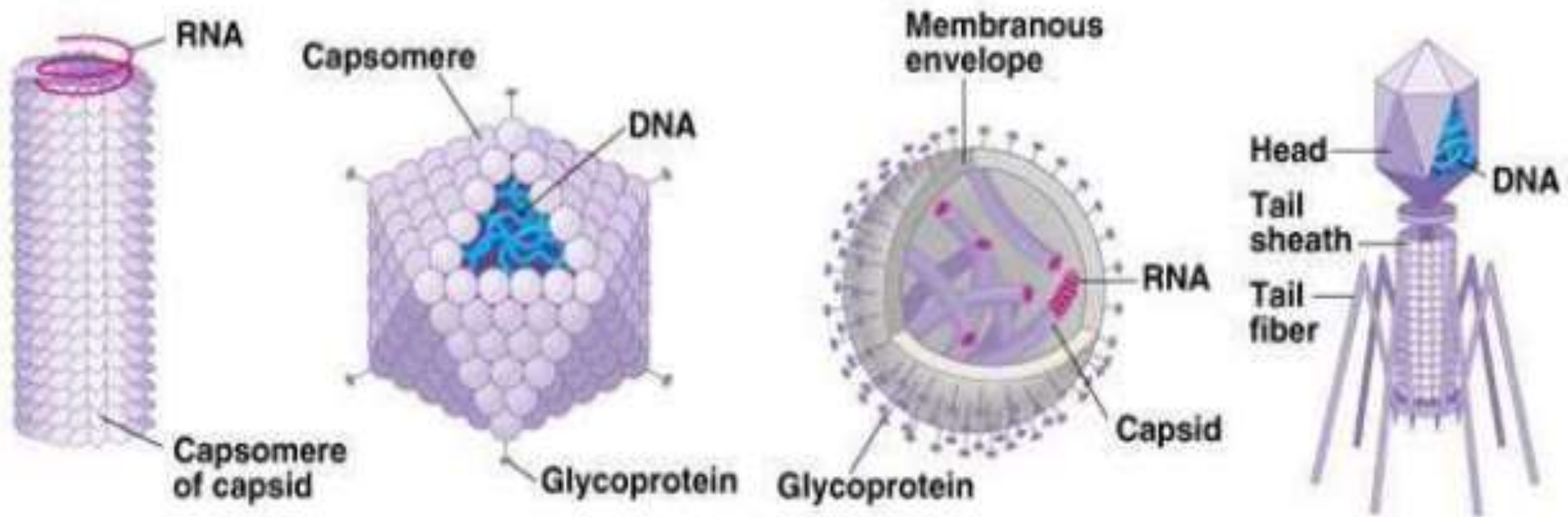


Entamoeba histolytica
(causes amebic dysentery)



6) **VIRUSES:**

- These are **acellular (non cellular) organisms that are too small and can be visualized** only using electron microscopes.
- All are **obligate parasites that require a living cell for reproduction.**
- They are **pathogenic to plants, animals and humans.**
- Ex: Cauliflower mosaic virus, Cucumber mosaic virus.



10 nm

(a) Tobacco mosaic virus



50 nm

(b) Adenoviruses



50 nm

(c) Influenza viruses



50 nm

(d) Bacteriophage T4