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Lab 3
Microscopic Observation of Simple Organisms (Bacteria & Protists)

Microscopic observation allows us to visualize organisms that cannot be seen with the naked eye. Among the simplest and most studied microorganisms are bacteria and protists. These organisms play important roles in ecosystems, research, medicine and biotechnology.

- **Bacteria** are microscopic, single-celled living organisms found almost everywhere on Earth. They are a type of prokaryote, meaning their cells are simple and do not have a nucleus or other membrane-bound organelles.

Main Features

1. Size & Structure: They are incredibly small, typically measured in micrometers (μm). Their simple cell structure includes:

- A cell wall (for protection and shape).
- A cell membrane.
- Cytoplasm (a jelly-like substance containing enzymes and nutrients).
- Genetic material (DNA) floating freely in a loop called a nucleoid.
- Some have flagella (whip-like tails for movement) or pili (hair-like structures for attachment).

2. Shapes: Bacteria often have one of three basic shapes:

- Coccus (spherical) - e.g., Streptococcus.
- Bacillus (rod-shaped) - e.g., E. coli.
- Spirillum (spiral-shaped) - e.g., Helicobacter pylori.

3. Reproduction: They reproduce mainly by binary fission, a simple process where one cell splits into two identical cells. This allows them to multiply very rapidly under the right conditions.

4. Metabolic Diversity: Bacteria are biochemical experts. They can get energy from virtually anything:

- Sunlight (photosynthesis, like cyanobacteria).
- Chemicals (e.g., sulfur, ammonia).
- Organic matter (like the food we eat).

❖ Where Are They Found?

Bacteria are ubiquitous. They live in soil, water, acidic hot springs, radioactive waste, deep in the Earth's crust, and in or on other living organisms (like us). They thrive in environments where most other life cannot survive.

❖ Why Are Bacteria Important?

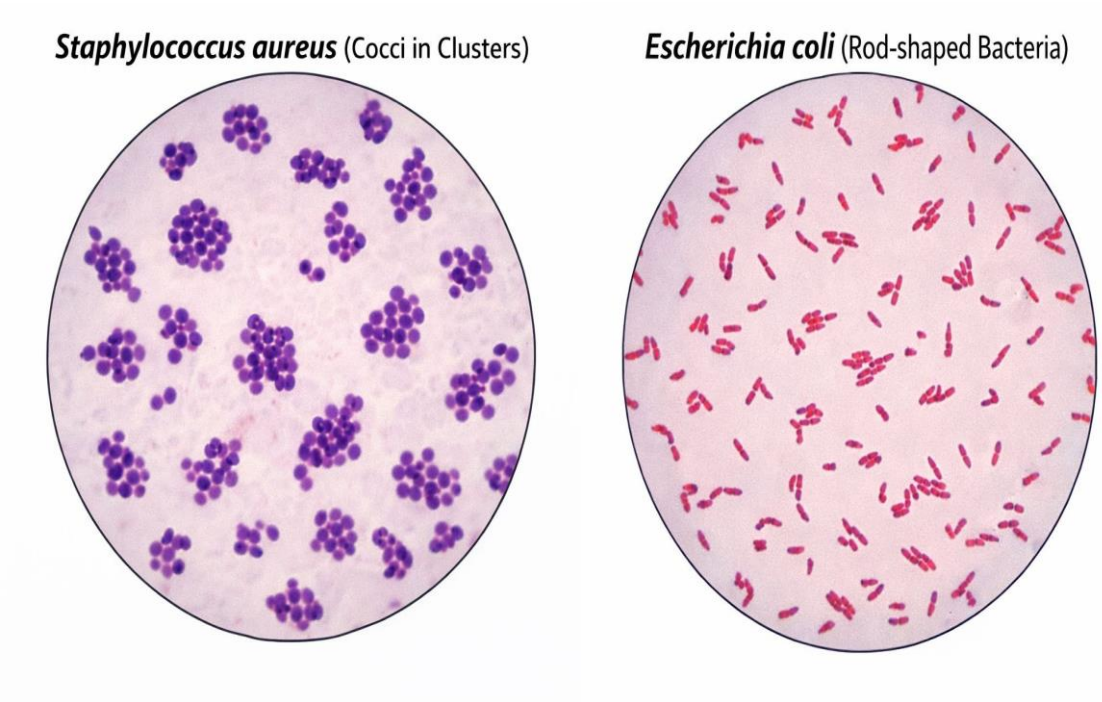
They play crucial and often opposite roles:

The Good (**Beneficial**)

The Bad (**Pathogenic**):

A small percentage of bacteria are pathogens that can cause disease in humans, animals and plants. Examples include:

- **Streptococcus pyogenes** (strep throat)
- **Mycobacterium tuberculosis** (tuberculosis)
- **Salmonella** (food poisoning)
- **Yersinia pestis** (the plague)



Summary

- Domain: Prokaryote (no nucleus).
- Size: Microscopic (1-10 micrometres).
- Cell Type: Unicellular.
- Reproduction: Primarily asexual (binary fission).
- Habitat: Everywhere.
- Impact: Essential for life on Earth, mostly harmless or beneficial, a small fraction cause disease.

- **Protists** are mostly unicellular eukaryotic organisms found in aquatic environments. They show different shapes and methods of movement and nutrition. Some protists are photosynthetic, while others are heterotrophic.

Main Types of Protists

Protists are commonly classified into three main groups:

1-**Protozoa**: Animal-like protists that are heterotrophic and usually motile.

Examples: **Amoeba**, **Paramecium**.

2-**Algae**: Plant-like protists that are autotrophic and perform photosynthesis.

Examples: **Chlamydomonas**, **Spirogyra**.

3-**Slime molds**: Fungus-like protists that feed on decaying organic matter.

Examples: **Physarum**.