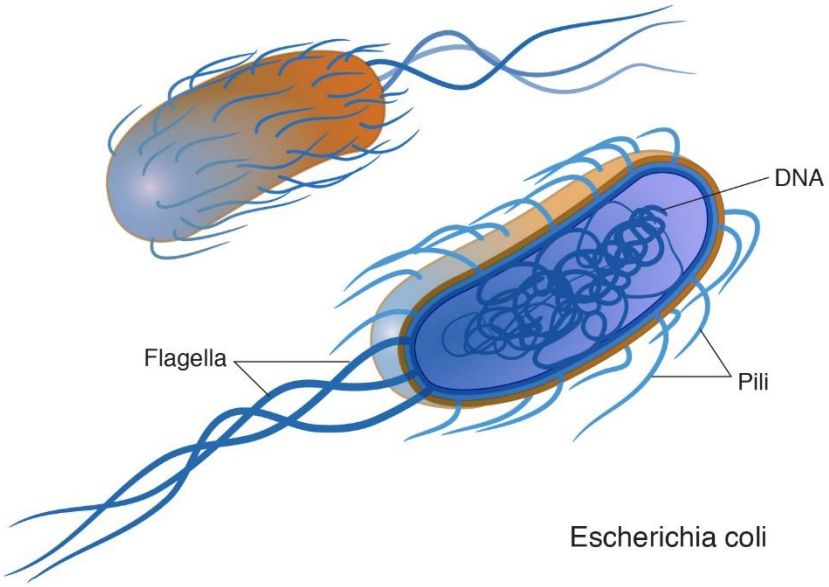
Economic Importance of Bacteria and Fungi

BACTERIA - A GENERAL STUDY

The bacteria are most primitive unicellular organisms. Each bacterial cell contains a single chromosome which is not enclosed in a nuclear membrane.



Escherichia coli

Size:

Bacteria are the smallest living organisms on earth, with an average size of 2 micrometres long and 0-5 micrometre thick.

Shape:

Shape-wise, the bacteria are usually of four types:

(1) Cocci (spherical bacteria), .

(2) Bacilli (rod-shaped bacteria),

(3) Spirilla (spiral or twisted bacteria),

(4) Vibrio (comma-shaped).

Structure:

- It contains the living substance protoplasm/ protoplast lying within the cell membrane surrounded by a non-living stiff cell wall.
- There is no well-defined nucleus but. chromatin (DNA) material is present in the central region.
- A slimy protective layer called capsule is present outside the cell wall.

Movement:

The lashing movements of the flagella provide active locomotion in environment. a liquid environment.

Nutrition:

• saprotrophic (drawing nourishment from decaying dead organisms),

• parasitic (drawing nourishment from the body of their living hosts).

Respiration:

Some bacteria respire by absorbing atmospheric oxygen (aerobic), others need no free oxygen (anaerobic). The anaerobic bacteria are killed if exposed to air.

Reproduction:

Reproduction in bacteria is only asexual by means of fission or cell division.

Highly primitive type of sexual reproduction

It has been found in very few bacteria and is extremely simple. In this method two bacteria of different strains come together.

Spores to overcome unfavourable conditions

When unfavourable conditions set in, such as the drying up of vegetation, the bacterial cell draws its content into a spherical mass which becomes surrounded by a thick and hard protective wall. This little rounded body is a spore which is contained within the original cell-wall.

• These can tolerate extreme dryness,

• Some cannot be killed even at the temperatures of boiling water or frozen ice,

• Some can tolerate poisonous chemicals.

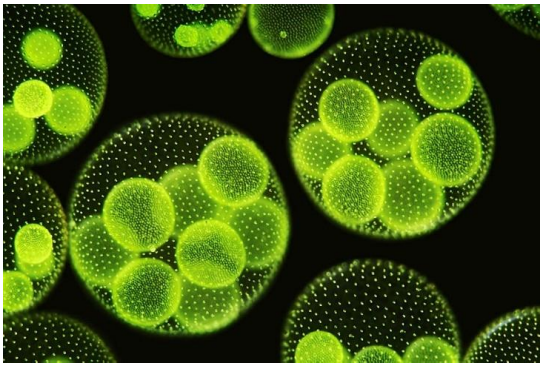
Spore-formation in bacteria is not a method of reproduction but simply a method of escaping unfavourable conditions.

USEFUL ROLE OF BACTERIA IN MEDICINE

Bacteria are used in medicine in the production of antibiotics, serum and vaccines.

Antibiotics: **An antibiotic is a chemical substance produced by a living organism which can stop the growth of some disease-producing bacteria and fungi.**

Serums: **Serum actually means blood plasma from which fibrinogen has been removed.**



Toxins: **Toxins are poisonous proteins released by pathogenic bacteria during their growth or on their breakdown after they die. The hormone insulin was the first such substance produced by E. coli.**

Vaccines: **A preparation consisting of weakened germs or dead germ substances.**

Vaccination: **Introduction of weakened germs or dead germ substances into the body for developing resistance to a particular disease.**

Two common vaccines obtained by growing bacteria are as follows:

Killed bacteria for TAB vaccine for typhoid. Living weakened bacteria for BCG vaccine for tuberculosis.

Toxoids: **Toxoids are the inactivated toxins of the particular bacteria.**

Bacteria have a very extensive use in industry.

(1) Different flavours of tea are produced by certain bacteria (this is termed tea curing).

(2) Leather tanning is primarily brought about by sunlight but certain bacteria break down the soft perishable parts of skin.

SPOILAGE OF FOOD BY BACTERIA

This spoilage may sometimes be to the extent of causing food poisoning Botulism's a very serious food poisoning due to a special bacterium sometimes found in tinned and sealed foods.

Food preservation can be brought about by several methods:

1. Boiling or heating at high temperatures (Sterilization)

Boiling water kills all bacteria except their spores. Higher temperatures (about 110° C) at increased pressure kill even the spores.

2. Salting

Salting is a common method of preserving foods like fish, pickles, etc.

3. Dehydration (Drying)

Most microbes cannot grow without water.

4. Irradiation

Radioactive radiation has been tried in sterilizing certain foods without themselves becoming radioactive, but the practice is not yet in much use.

5. Pasteurization

Pasteurization is a technique of partial sterilization applied usually to milk. The milk is heated to a temperature of about 60°C for a period of 30 minutes and then chilled quickly.

6. Refrigeration (cold temperature)

Microbes (bacteria and moulds) do not grow and multiply at or below the freezing point of water.

BACTERIAL DISEASES IN PLANTS AND ANIMALS

A. In Plants

Two very common diseases of plants caused by bacteria are black rot of mustard and cauliflower and bacterial blight of cowpea.

B. In Animals

Two common bacterial diseases of cattle among animals are:

1. Anthrax yield - Swelling on body and reduced milk

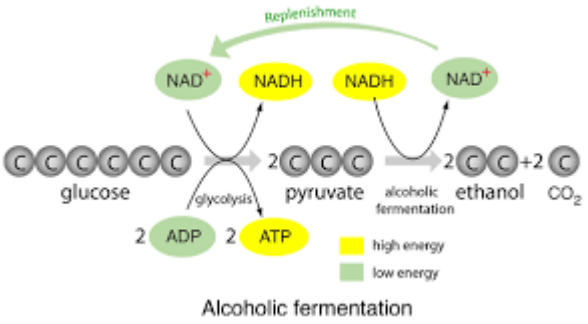
2. Tuberculosis - Lungs affected, dry husky cough.

Harmful Fungi

Penicillium and Aspergillus are two common moulds popularly called blue and green mould respectively.

Fermentation

It is a process in which the microorganisms (yeast and bacteria) break down carbohydrates into simpler products (ethanol or lactic acid) in the absence of oxygen.



Alcoholic fermentation